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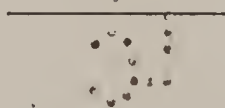
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sections of the Old World pens of this kind are still used extensively. The quills are at first soft and tough, but they are prepared for use by a process of heating and dipping in alum water, after which they are cut for use with a pen-cutter's knife.

Steel pens are now in general use among the people of America, Europe, and most of the more highly civilized countries. They were first manufactured in the early part of the 19th century, and originally were made to resemble the quill pen, forming a barrel of very thin steel, being cut and slit in the manner of a quill. The principal fault was their hardness, which caused them to scratch the paper in a disagreeable manner. In 1820 Joseph Gillott introduced marked improvements in the manufacture of pens, by which he was able to make them of much thinner sheets of steel and thus render them more elastic, at the same time giving them higher finish and temper. His factory at Manchester, England, became an important seat of pen making, and the price was so materially reduced that in 1821 1,000 pens could be purchased at the price of a single pen made by manufacturers at the same place in 1803. Other improvements in pen manufacture speedily followed, and within a very short time

land are the most important in Europe, though Germany, France, Sweden, and a number of other countries produce large quantities. The *Gillott pens* and several others of European make are sold extensively in the markets of Canada and the United States.

PENANCE (pě'n'ans), the penalty accepted or self-imposed by a repentant sinner who manifests his sorrow for sin. In this way the penitent sinner seeks to avert punishment through the atonement. Luther taught the doctrine of justification by faith in Jesus Christ alone, and opposed the doctrine of penance as being contrary to the essential principle that Christ completed or finished his work. In this he has been generally followed by Protestants, who do not recognize penance. The Roman Catholics regard it as one of the seven sacraments and believe that it is of divine origin. They instituted it from the words of Jesus in John xx., 22: "Receive the Holy Ghost; whose sins ye shall forgive they are forgiven them, and whose sins ye shall retain they are retained." The conditions required on the part of the penitent are contrition and confession, after which absolution is pronounced by the priest. While this releases him from sin, the temporal reparation required by divine justice is not al-



steel pens came into general use. The process of manufacturing involves a variety of operations, including the rolling of the best quality of cast steel into sheets, cutting them into flat pieces called *blanks*, and afterward stamping and embossing them. An emery wheel is used to finish the nibs or points, after which the slit is cut, and the pens are glazed with a varnish and boxed for the market.

Gold pens are more expensive than those made of steel, but by exercising care they serve a useful purpose for many years. The nibs of gold pens are made by tipping them with iridium, one of the hardest of metals, after which they are ground down on an emery wheel and polished. *Fountain pens*, having a reservoir from which the ink feeds by gravity to the point, were invented by Joseph Bramah. A similar class, the *stylographic pen*, has a reservoir to hold the ink, but the fluid escapes when the pencil-shaped point is pressed upon the paper. These pens are used extensively by persons desiring to have writing material at hand when they are away from the office. Pen making is now an important industry. Extensive factories are maintained in which millions of pens are made annually for home use and for exportation. The principal manufacturing factories of North America are located in Camden, Philadelphia, Meriden, and New York City. At present the pen manufacturing factories of Eng-

ways canceled, but this satisfaction, as it is termed, is imposed in the form of prayer, almsgiving, and fasting.

PENANG (pě-n'ang'), or **Prince of Wales Island**, an island belonging to Great Britain, situated near the west coast of the Malay Peninsula, in the Strait of Malacca. It is about thirteen miles long and seven miles wide, and has an area of 106 square miles. The surface is partly mountainous, but consists in part of fertile plains. It is well watered and has a favorable climate. Among the principal productions are coffee, rice, pepper, tapioca, nutmegs, coconuts, cloves, sugar, and tropical fruits. Minerals are found in the mountains, especially tin ore. In all parts of the island are valuable forests. Georgetown is the capital and principal seaport. The inhabitants consist mostly of Chinese, Malays, and Burmans. Mohammedanism is the chief religion, but many natives are Christians. Population, 1916, 128,986.

PENCIL (pě'n'sil), an instrument used for writing, drawing, marking, and painting. It is usually made of a slender casing of wood inclosing a thin strip of graphite, colored chalk, or other material, or of a relatively large piece of graphite, slate, or chalk without a casing. The name is frequently applied to a small brush of hair used by painters in laying on their colors, the hairs used being mostly those of the

badger, camel, mink, and goat. In some cases the bristles of hogs are used in making such pencils. Originally pencils consisted of chalk and other material cut to be held in the hand, but later pencils similar to the black-lead instrument now used extensively were invented. The first allusion to a pencil formed of wood and lead occurs in a treatise on fossils by Conrad Gesner, of Switzerland, bearing date of 1565. Pure lead was used in writing for some time, but, as this makes only a light mark on paper, it was soon displaced by the discovery of graphite or plumbago, which is now employed in the manufacture of the common black-lead pencils in general use. The wooden casing is usually made of cedar, though higher grades of pencils are made of more expensive species of wood.

The casing of lead pencils consists of two slips of unequal thickness, the thicker one having a groove in which the lead fits perfectly and the thinner one being glued on to cover the lead. After these parts are adjusted, the pencil is rounded in a revolving cutting machine. Pencils of an inferior quality are made of a mixture of sulphur and the dust of graphite, but this preparation is softened by the addition of a little tallow. Colored pencils are made of a mixture of clay with mineral coloring matter. The essential part of indelible and copying pencils is composed of clay and gum colored with an aniline preparation. Slate pencils are cut from thin strips of slate and afterward rounded by a cutting machine, or are made by encasing thin strips of slate in wood.

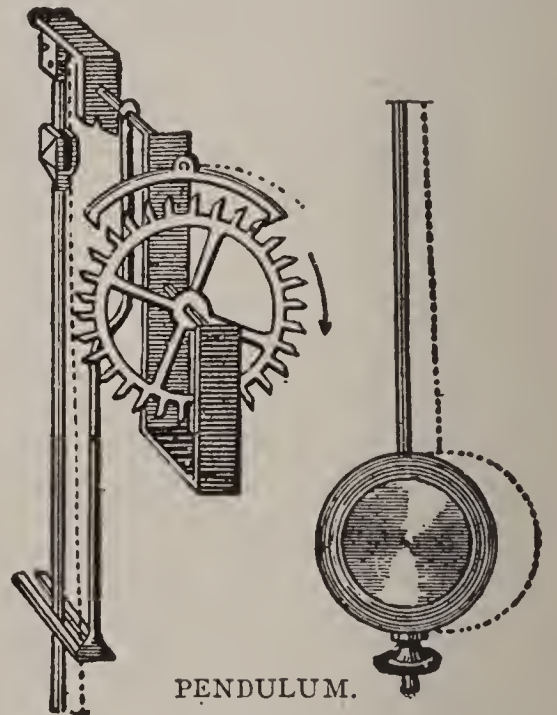
The largest manufactories of lead pencils in Europe are situated at Nuremberg, Germany, where extensive deposits of graphite occur. The first manufactory for making lead pencils in the United States was established in New York City by M. L. Leman in 1830. In 1849 A. W. Faber, of Stein, Germany, established an agency in New York, and in 1881 founded a large manufactory in the same city, from which the pencil-making industry of America may be said to date. The Joseph Dixon Crucible Company has one of the largest pencil manufactories in the world, at Camden, N. J. Usually pencils are numbered according to the degree of hardness, as 1, 2, 3, 4, etc., the larger numbers representing those having harder lead than No. 1. In some cases letters are employed for the same purpose.

PENDLETON (pĕn'd'l-tŭn), a city of Oregon, county seat of Umatilla County, on the Umatilla River, 45 miles southwest of Walla Walla, Wash. It is on the Washington and Columbia River Railway and the line of the Oregon Railroad and Navigation Company. The surrounding country has large interests in farming and stock raising. Extensive water power is supplied by the river, furnishing an abundance for manufacturing purposes of various kinds. The county courthouse, two

academies, the high school, and a number of churches are among the public buildings. The manufactures include flour, artificial ice, and machinery. It has electric lighting, a sewerage system, and public waterworks. Population, 1900, 4,406; in 1920, 7,387.

PENDLETON, George Hunt, statesman, born in Cincinnati, Ohio, July 25, 1825; died in Brussels, Belgium, Nov. 24, 1889. After receiving an education and being admitted to the bar, he established a law practice in Cincinnati and served in the State senate from 1854 to 1855. He was elected to Congress as a Democrat in 1856, serving in that capacity until 1865. The same party nominated him for Vice President with George B. McClellan in 1864. He was a United States Senator from Ohio from 1879 until 1885, and in the latter year was appointed as minister to Germany by President Cleveland. Pendleton was an able advocate of civil service reform and was chairman of a committee that proposed an act having that policy as its object.

PENDULUM (pĕn'dŭ-lŭm), a body suspended or supported from a fixed point by a rod or cord so as to swing freely to and fro. The path through which it passes is called the *arc*, its movements to and fro are termed *vibrations*, or *oscillations*, and the extent to which it goes in either direction from the lowest point is styled its *amplitude*. Vibrations performed in equal times are said to be *isochronous*.



A pendulum once set in motion would continue to move forever in the same arc if it were not impeded by the friction of the air and other agencies, since it acquires sufficient force while moving downward the first half of the circular path to raise it to the same height on the opposite side. The three laws of the pendulum may be briefly stated as follows: 1. In the same pendulum, all vibrations of small amplitude are isochronous. 2. The times of the vibrations of different pendulums are proportional to the square root of their respective lengths. 3. The time of the vibration of the same pendulum varies at different places.

The *first law* was discovered by Galileo in watching the motions of a lamp swinging at the end of a long chain suspended from the cathedral roof at Pisa, where he observed that the oscillations were always equal in duration, and, when the arc of the circle became shorter, the

movements were correspondingly slower. The resistance which the air offers causes the pendulum to swing through smaller and smaller arcs until it comes to rest, unless it is connected with a spring or weight. According to the *second law*, a pendulum one-ninth the length of another will vibrate three times as fast. Thus, a pendulum which vibrates seconds must be four times as long as one which vibrates half seconds. Heat lengthens and cold contracts the rod of a pendulum, if it be of a single metal, as steel or iron. These effects are neutralized by compensation pendulums, the two classes being known as mercurial and gridiron pendulums.

A *mercurial* pendulum has a vessel containing mercury at the lower end. The adjustment is such that, when the pendulum is expanded downward by the heat, the mercury ascends in its inclosure, and, when the pendulum is contracted by cold, it descends correspondingly. The *gridiron* pendulum has bars of iron and brass to work against each other, the contraction or expansion of certain rods being overcome by that in the others. Clocks not provided with compensation pendulums have a screw below the bob, by which the length of the pendulum may be regulated according to the temperature at different times of the year, while others have a pendulum of wood, which is less liable to expansion and contraction than metal. The *third law* of the pendulum was discovered by observing the vibrations of a pendulum at different latitudes. At the Equator a pendulum vibrates most slowly, this being due to the fact that vibrations are directly proportional to the force of gravity at the place. The length of a pendulum vibrating seconds at sea level at the Equator must measure 39.02 inches; at New York, 39.10; at London, 39.13; and at Spitzbergen, 39.21. See **Escapement**.

PENELOPE (pē-nēl'ō-pē), in Greek legend, the wife of Ulysses (Odysseus) and mother of Telemachus. The husband had gone to the Trojan War during the infancy of the latter, and while he was absent Penelope was harassed by the importunities of numerous suitors, who had taken possession of his home and devoured his substance. Penelope deferred giving answer until she could weave a robe for the aged Laertes, but in order to gain time secretly undid at night what she had done in the day. In this way it was possible for her to retard the completion of the work, but her stratagem was discovered by an angry suitor just as Ulysses came back to Ithaca. The latter promptly slew those who had so improperly invaded his home.

PENGUIN (pēn'gwīn), a genus of web-footed birds found in the Southern Hemisphere. They have short wings that are useless in flight. The feet are adapted for an erect position of the body, the legs are very near the back part,

and the body is covered with short, rigid feathers. A large number of species have been described, the principal ones being known as the *petrel penguin*, *great penguin*, *king penguin*, and *jackass penguin*. Most of the species measure about two feet when standing erect, have completely webbed toes, and are remarkably skilled in swimming and diving, their rudimentary wings facilitating the rapidity of movement. They are found most abundantly in the high latitudes, especially on the shores of the Straits of Magellan, where they congregate in large flocks on rocky islands and coasts to breed. Navigators have frequently observed from 25,000 to 30,000 of these birds congregated together. They are described as stupid when approached, but show some courage when



PETREL PENGUIN. GREAT PENGUIN.

actually attacked. The young are edible. Penguins feed on cuttlefish and other marine animals and many species are noted for their bright plumage. These birds are remarkable for incubating their eggs by keeping them close between the thighs. The female becomes very fat during incubation, subsisting on food gathered for it by the male.

PENINSULAR CAMPAIGN (pēn-īn'sū-lēr), the name given to a movement in the Civil War of the United States, by which it was designed to capture Richmond, Va., the capital of the Confederate States. General McClellan was appointed to command all the Federal troops in the vicinity of Washington, on July 21, 1861, and everywhere resounded the popular cry, "On to Richmond." The campaign properly began on April 2, 1862, when McClellan landed his forces at Fort Monroe and marched between the York and James rivers toward Richmond, where General Johnston was in command. The Federals had an army of 120,000 men. They

spent a month in the siege of Yorktown, but all the Confederates escaped. On May 4 McClellan was successful in the Battle of Williamsburg, where he defeated Johnston. However, Stonewall Jackson, with an army of 20,000 Confederates, marched through the Shenandoah valley and gained victories at McDowell and Winchester.

A large portion of McClellan's army took a position at Fair Oaks, where Johnston made a vigorous attack but was repulsed and wounded. He was succeeded in command by General Lee, who immediately sent reinforcements to Jackson in the Shenandoah valley. Then followed the engagements at Mechanicsville, Gaines's Mill, White Oak Swamp, Frazer's Farm, and Malvern Hill, known collectively as the Seven Days' Battles, and all were unfavorable to the national cause. In the last of these engagements, that at Malvern Hill, the Confederates sustained great losses and were defeated, but McClellan ordered a retreat to Harrison's Landing, where he reorganized his forces, but soon embarked for Washington. The Peninsular Campaign ended by the later part of July, but Richmond had not been reached, although the Federals lost about 15,000 men. As a result of this movement, public confidence in the Federal army was weakened, while the Confederates gained strength in this respect.

PENINSULAR WAR, the name generally applied to a war waged by Napoleon for the conquest of Spain and Portugal. It was caused principally by a disagreement between Charles IV., King of Spain, and his son Ferdinand, in 1807, which Napoleon made the occasion of interference. Accordingly he placed his brother Joseph on the throne of Spain, who was proclaimed king on July 24, 1808. The royal family of Portugal had previously fled to Brazil, but the people of both Portugal and Spain rose against the French in all parts of the peninsula. Napoleon had stationed French troops at many strategic points and the people at first carried on a guerrilla warfare, but on July 12, 1808, a British army of 30,000 men was sent under Sir Arthur Wellesley, afterward Duke of Wellington, to aid in expelling the French. He landed at Figueras, Portugal, and on Aug. 21 defeated the French under General Junot at Vimeiro. Wellesley was superseded in the command by Sir Harry Burrard, who soon after was superseded by Sir H. Dalrymple, and the latter on Aug. 30 concluded the Treaty of Cintra, by which Junot agreed to evacuate the country.

Napoleon, being dissatisfied with the turn of affairs, sent large reinforcements to Spain and came in person to Madrid to direct his army. At that time Sir John Moore commanded the forces in Spain, and on Jan. 16, 1809, lost his life in the Battle of Coruña. Shortly after Wellesley returned to take command of an army

made up of English and Portuguese, when he was confronted by 375,000 French veterans. His operations were attended by a series of successful battles, the most noted being those of Salamanca in 1812 and Vittoria in 1813. On Oct. 7, 1813, the French were driven across the Pyrenees into France, and the war was concluded the following year by a decisive victory at Toulouse. In 1814 the veterans of Wellington's army were transported to America to take part in the campaign against the United States.

PENN, William, founder of the colony of Pennsylvania, born in London, England, Oct. 14, 1644; died at Ruscombe, England, July 30, 1718.

He was the son of Admiral William Penn, studied at Christ Church, Oxford, and there joined the new sect of Quakers. He traveled a few years in Italy and France and later became



WILLIAM PENN.

a court favorite in England. In 1666 he managed an estate in Ireland for his father and was imprisoned at Cork for attending a meeting of Quakers. Soon after he became a minister of that sect, because of which he lost for a time the good will of his father, and in 1668 was imprisoned in the Tower for publishing a pamphlet entitled "The Sandy Foundation Shaken," which opposed the doctrine of the Trinity and other teachings of the Established Church. While in prison he wrote several works that attained to much popularity, among them "No Cross, No Crown," and "Innocency with Her Open Face." After seven months he was liberated through the influence of the Duke of York. The meetings of Dissenters were prohibited in 1670, but he continued active in spreading their doctrines and was again imprisoned. After refusing to take the oath of allegiance, which he did from conscientious scruples about swearing, he was confined for six months at Newgate. Soon after regaining liberty, he visited Germany and Holland for the advancement of Quakerism and, on returning to England, in 1672, married Gulielma, the daughter of Sir William Springett.

His father having died in 1670, Penn came into possession of an estate valued at \$7,500 per year and acquired a claim against the government for \$80,000. He continued his diligence in propagating the doctrines of his sect by preaching and writing, and in 1681 accepted from the government a grant of the region now included in the State of Pennsyl-

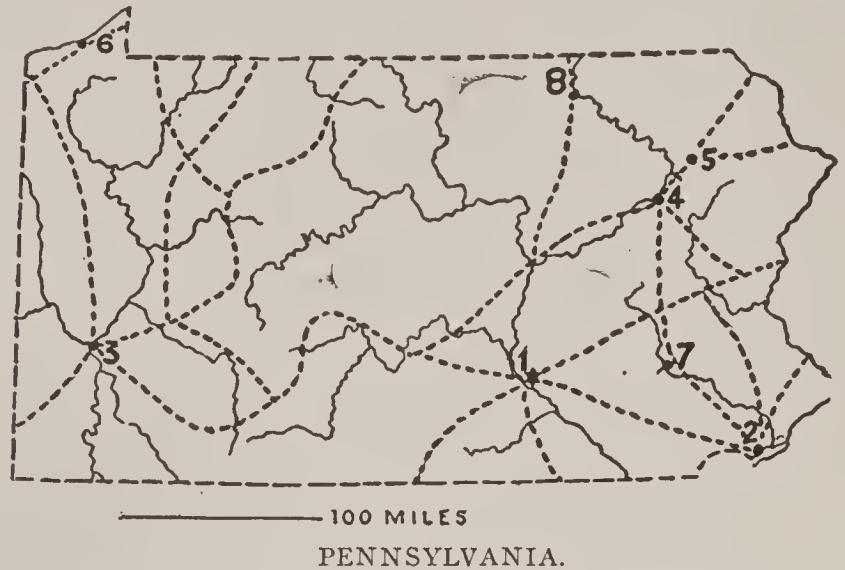
vania in lieu of his monetary claim. It was especially provided that he should be at liberty to promulgate his religious and political views and to found such colonies as he desired. The region was named Pennsylvania in honor of his father at the suggestion of King Charles II. In August, 1682, he and several friends sailed for the region of the Delaware, and on Nov. 30 they met with representatives of several Indian tribes for an interview on the present site of Philadelphia. The consultation ended in purchasing the lands from the Indians, who always held Penn in great reverence. He founded the colony on a democratic basis, extending to all a large degree of religious liberty, planned the city of Philadelphia, and administered the affairs of the colony with much wisdom and liberality. Under the policy of Penn all sects were allowed to settle in Pennsylvania and their religious and civil rights were respected, a course which caused many who were persecuted for expressing their views to seek refuge in his colony.

He returned to England in 1684. When the Duke of York succeeded to the throne as James II., Penn became highly influential at the court, and through his efforts a large number of Friends were liberated from prison. After the Prince of Orange succeeded to the throne, Penn continued on intimate terms of friendship with the abdicated monarch, and was accordingly charged with treason in 1689. This charge was removed and he was honorably acquitted in 1693. In 1699 he made a visit to his colony in Pennsylvania, when he improved materially its industrial conditions, brought about a more satisfactory state of affairs in the government of the same, and bettered the relations between the colonists and the Indians and Negroes. He returned to England in 1701 to personally look after the interests of his estate, which had been left to the management of a man named Ford, who had wasted many of the resources and left extortionate claims against Penn. Refusing to pay some of these claims, Penn was thrown into the Fleet prison in 1708, from which his friends soon after released him. His most important writings include "The Great Cause of the Liberty of Conscience," in which he defended the doctrine of toleration. He died of paralysis and was buried near the village of Chalfont Saint Giles, in Buckinghamshire, in the Jordan cemetery.

PENNELL (pĕn'nĕl), **Joseph**, etcher and illustrator, born in Philadelphia, Pa., July 4, 1860. He developed skill in drawing at an early age and married Elizabeth Robins. Much of his work was done with the assistance of his wife. The two traveled extensively in Europe, where he was arrested in 1891 by officials in Russian Poland on suspicion of securing pictures of forts. They published a series of illustrated works, including "Two Pilgrims' Progress," "The Stream of Pleasure," "Play in

Provence," and "To Gypsyland." He wrote "Pen-Drawings and Pen-Draughtsmen" and illustrated Sterne's "Sentimental Journey" and Justin McCarthy's "Journey to the Hebrides."

PENNSYLVANIA (pĕn-sĭl-vā'nĭ-ă), one of the original thirteen states of the United States, classed with the middle Atlantic group, popu-



1, Harrisburg; 2, Philadelphia; 3, Pittsburg; 4, Wilkesbarre; 5, Scranton; 6, Erie; 7, Reading; 8, Towanda.

larly called the *Keystone State*. It is bounded on the north by Lake Erie and New York, east by New York and New Jersey, south by Delaware, Maryland, and West Virginia, and west by West Virginia and Ohio. The length from east to west is 302 miles; width, 158 miles; and area, 45,215 square miles, of which 230 square miles are water surface.

DESCRIPTION. The surface is generally hilly and mountainous through the central part, where the Appalachians trend across the State from northeast to southwest, the principal chains being the Allegheny and Blue Ridge mountains. In the eastern part is a portion of the Piedmont plain, which is elevated but slightly above sea level, and from it the surface rises toward the west. South Mountains, an isolated group of hills, stretches through the southeastern part. West of these hills are the Blue Mountains, which range in altitude from 1,000 to 1,500 feet above the sea. Farther west, trending parallel to it, are the Allegheny Mountains, which culminate in North Knob, 2,685 feet, the highest summit in the State. The western half of the State is characterized by the Allegheny Plateau, elevated from 1,000 to 2,000 feet, and through it the rivers have cut narrow and deep valleys. The State has a coast line of 45 miles on Lake Erie, along which lies a narrow lake shore plain. The only good harbor is at Erie.

The Delaware River, which forms the eastern boundary, drains the eastern part of the State. It receives a number of tributaries, including the Lehigh and the Schuylkill. A large region in the central part is drained by the Susquehanna and its tributaries. These include the West Branch and the Juniata, both from the west. The western part belongs mainly to the Mississippi system and is drained chiefly by

the Allegheny and the Monongahela, which unite at Pittsburg to form the Ohio. Within the State, from Pittsburg to Beaver, the Ohio flows toward the northwest, and then assumes a southwesterly direction and crosses the western border. A small area in the south central part is drained into the Potomac and a few short streams flow into Lake Erie. The State has numerous mountain lakes, but all are small.

The climate is more equable and warmer along the Delaware than farther inland, being influenced by the breezes from the Atlantic. Extremes of temperature are quite marked in most parts of the State, ranging from 20° below zero to 105° above. At Pittsburg the mean temperature for January is 31° and for July 75°, while at Philadelphia the corresponding figures are 32° and 76°. Rainfall is evenly distributed throughout the year as well as in most parts of the State. It is given at 44.5 inches for the year, but in some localities it falls as low as 35 and in others reaches 50 inches. Snow falls to a depth of several feet, especially in the mountains and in the northwestern part.

MINING. In mining Pennsylvania has long held first place. The output of coal exceeds in value the total mineral product of any other State, partly for the reason that it is conveniently located to the larger markets, but chiefly because its quality of anthracite is the finest in the world. The anthracite mines are principally in the vicinity of Pottsville, Pittsburg, Hazelton, Scranton, Ashland, Shenandoah, and Wilkesbarre. Extensive deposits of bituminous coal are found in many sections of the State, but the leading shipping centers are at Johnstown, Connellsville, Irwin, Idlewood, Philipsburg, Towanda, Mercer, and Monongahela City. In the output of natural gas Pennsylvania exceeds all other states, and it has long held an important place for the production of petroleum. Marble quarries of great value are worked in the vicinity of Philadelphia, and limestone, sandstone, and valuable clays are abundant, occurring in many places between the veins of coal. Lancaster County has deposits of nickel and lead and copper are mined at Phoenixville. The State produces more than half of the entire output of slate in the country and large quantities are used in building and for export. Iron has been mined since the early colonial period and the output long supplied the iron furnaces, but at present large quantities are imported from the mines in the vicinity of Lake Superior. The larger deposits mined at present are near Lebanon, in the Cornwall hills. Other minerals include talc, salt, feldspar, bromide, ochre, glass sand, and mineral waters.

AGRICULTURE. The soil of the valleys and undulating regions is generally fertile, while the more hilly portions are formed principally of clays and rock. Formerly much of the surface

was covered with a heavy growth of timber, and fine forests are still maintained, but they are largely in connection with the farms and are used more or less for pasturage. The farms as a rule are small, but are well tilled and farming is diversified. Hay is grown on a larger acreage than any other product. The cereals grown extensively include wheat, corn, and oats. Considerable interests are vested in raising rye, buckwheat, potatoes, and tobacco. Grapes, peaches, apples, and small fruits are grown extensively.

The live-stock interests are centered largely in raising cattle, and fully half of this class of farm animals is represented by dairy cows. Much of the dairying is conducted on a coöperative basis, and the greater share of profits is obtained from the sale of milk, but much attention is given to the production of butter and cheese. A fine class of horses is grown and large investments are represented by the sheep and swine industry. Mules are raised for use as draft animals, especially in connection with the mines. The poultry products are extensive.

MANUFACTURES. The State has taken second rank in manufacturing since 1850, being exceeded only by New York. In the output of steel and iron products it surpasses all the other states combined. It produces about half of the Portland cement made in the United States and holds a very high place in the production of coke. Philadelphia is the chief center of the textile industry, producing large quantities of cotton and woolen goods, silk fabrics, and ingrain carpets. About half of the steam locomotives made in the country are produced in Pennsylvania and large quantities of railway cars are constructed, the chief centers of the latter enterprise being in Altoona, Philadelphia, and Reading. In the building of iron and steel ships the State has a foremost position. It produces large quantities of machinery, malt and distilled liquors, and boots and shoes. Other manufactures include glass, leather, cured and packed meats, flour, tobacco products, sugar, chemicals, and electrical apparatus. The forests yield large quantities of merchantable timber, such as hemlock, white pine, chestnut, oak, laurel, and walnut. Much of the timber is used for lumber, paper, and furniture.

TRANSPORTATION AND COMMERCE. The railroads aggregate 11,500 miles, which is exceeded only by the mileage of Illinois and Texas. Many trunk lines cross the State and all of them have branches, hence nearly every part has adequate transportation facilities. The principal lines include those of the Lake Shore and Michigan Southern, the Pennsylvania, the Lehigh Valley, the Erie, the Baltimore and Ohio, the Philadelphia and Reading, the Delaware, Lackawanna and Western, and the Pittsburg, Cincinnati, Chicago and Saint Louis. Electric railways are operated in many rural districts. About 800 miles of canals are in use, but this class of trans-

portation is not as important as formerly, though considerable quantities of coal and other freight are transported by these means. Pittsburgh, Philadelphia, Scranton, and New Castle are among the leading railway centers. Lake Erie, the Delaware, and the Ohio furnish transportation facilities of considerable extent.

The State has a large domestic and foreign commerce. Erie and Philadelphia are ports of entry, and the latter ranks third in the value of foreign trade among the ports of the Atlantic coast. Large quantities of lumber are imported from Canada through Erie, which exports much coal and manufactured articles. Iron ore takes rank as the leading import. The smelters are chiefly at Pittsburgh and other centers where iron and steel are manufactured. Much trade is carried westward by the Ohio and by the railroads.

GOVERNMENT. The first constitution was adopted in 1776, when the State was organized. A new constitution was adopted in 1790 and this has been amended several times. It vests the chief executive authority in the governor and lieutenant governor, elected for four years; the secretary of internal affairs and auditor-general, for three years; and treasurer, for two years. The Governor, with the consent of the senate, appoints a secretary of the commonwealth, an attorney-general, and a superintendent of public instruction, each for four years. The legislative authority is vested in a Legislature, consisting of a senate of not more than fifty members chosen for four years, and a house of representatives with a membership apportioned according to population and elected for two years. Sessions of the Legislature are held biennially, beginning on the first Tuesday of January. The supreme court consists of seven judges, who are elected by the people for a term of 21 years and are ineligible for reelection. A superior court, the courts of common pleas, and several minor courts are subordinate to the supreme court. Local government is administered by the counties, cities, towns, and villages.

EDUCATION. The public school system of Pennsylvania was established by law in 1834 through the efforts of Gov. Geo. Wolf, Judge Samuel Breck, and others. In 1835 Thaddeus Stevens saved the law from repeal in a speech which he regarded the greatest effort of his public life. The law passed in 1854 was much improved and created the office of county superintendent. Text-books and school supplies were made free to all the children in 1893. Two years later a general law for the establishment of high schools was enacted. The school unit is the township, city, or borough, but the law also provides for the creation of independent districts. The schools are maintained by local taxation, supplemented by liberal appropriations from the State. In 1907 the Legislature made a biennial appropriation of fifteen million dollars for school purposes. This does not include the large

appropriations for normal schools and other educational purposes.

The attendance in public schools approximates 1,350,500 children, in addition to which 150,000 are enrolled in private and parochial schools. The University of Pennsylvania, located at Philadelphia, with an attendance of about 9,000 students, is a cosmopolitan institution and has over 100 more students from foreign countries than any other university in America. Pittsburgh is the seat of the Western University of Pennsylvania, which has departments of law, medicine, dentistry, and pharmacy in addition to those in the arts and sciences. State College, located in Center County, has an attendance of over 3,000 students in the departments of art, agriculture, engineering, and the sciences. Lehigh University, at South Bethlehem; Lafayette College, at Easton; Jefferson Medical College, at Philadelphia; Drexel Institute, at Philadelphia; the Carnegie Technical Schools, at Pittsburgh; and other institutions for higher learning have a national reputation. The State maintains thirteen State normal schools located as follows: Westchester, Millersville, Kutztown, East Stroudsburg, Mansfield, Bloomsburg, Lock Haven, Indiana, California, Slippery Rock, Edinboro, and Clarion. The total value of the public school property is estimated at between sixty and eighty million dollars. A total of 38,500 teachers are employed. The schools are managed by directors or controllers, who are elected by the people, except in Philadelphia, where the board of education consists of twenty members appointed by the judges. School attendance is compulsory between the ages of eight and sixteen years.

Hospitals for the insane are located at Warren, Danville, Harrisburg, Norristown, Dixmont, and Warrentonville. Erie has the State Soldiers' and Sailors' Home. Penitentiaries are located at Allegheny (Pittsburg) and Philadelphia. Allegheny County has a workhouse, Morgantown has a reform school, Huntington has an industrial reformatory, and Philadelphia has a house of refuge and a house of correction. Carlisle is the seat of the principal Indian school in the country, being maintained by the Federal government.

INHABITANTS. The State has a population of 140 to the square mile. In the number of foreign born inhabitants it has second rank, having a total of 985,250. The most numerous of this element are the Irish, Germans, and English. The Methodist, Presbyterian, Lutheran, Baptist, Roman Catholic, and Episcopal are the leading religious denominations. Harrisburg, on the Susquehanna, is the capital. Other cities include Philadelphia, Pittsburgh, Scranton, Reading, Erie, Wilkesbarre, Lancaster, Altoona, Allentown, Johnstown, McKeesport, Chester, York, Williamsport, New Castle, Easton, Norristown, Shenandoah, Lebanon, Shamokin, Pottsville, Pottstown, Hazeltown, and Mahanoy City. In 1900 the State had a population of 6,302,115.

This included 1,639 Indians, 1,927 Chinese, and 156,845 Negroes. Population, 1920, 8,720,159.

HISTORY. The history of Pennsylvania dates from 1609, when Henry Hudson visited Delaware Bay and the Delaware River. Swedish colonists established the first permanent settlements at Chester in 1643, but the Dutch took possession of that region in 1655. William Penn obtained a grant of the region now included in the State from Charles II., in 1681, in consideration of \$80,000. The colony planted by Penn was designed as a refuge for Quakers, but he extended religious liberties to all and established relations of friendship with the Indians by treaty, both parties observing the conditions faithfully for fully fifty years. A dispute between Pennsylvania and Connecticut as to the territory north of latitude 41° arose in the course of time, but it was settled in 1783 in favor of the former. Another dispute as to the boundary occurred with Maryland, which was settled by establishing the Mason and Dixon line in 1763 and 1767. Philadelphia was the seat of the first Continental Congress, in 1774, and here the Declaration of Independence was issued on July 4, 1776. The Battle of Germantown, on Oct. 4, 1777, and the incidents of Valley Forge identify the State with the Revolution. It included many Tories among its inhabitants, but gave loyal support to the colonies, and the State was equally enthusiastic in supporting the Union in the War of 1812, the Civil War, and the Spanish-American War. A State constitution was adopted in 1776, but was replaced by the present constitution in 1790, and the National Constitution was ratified on Sept. 12, 1787.

Pennsylvania has been an important factor in the Union from the beginning. It has grown in wealth and population with every decade. In 1794 it was disturbed by the Whisky Rebellion, which was caused by the opposition of the Scotch and Irish to the excise tax. The Schuylkill Canal was completed in 1825. A system of public schools was established by the Legislature in 1834. Anthracite coal was first mined on a large scale in 1839, when it came to be used extensively in the manufacture of iron, and the first oil well was sunk at Titusville in 1859. The Johnstown flood, in 1889; the Homestead strike, in 1892; and the anthracite coal strike, in 1902, are other events. The panic of 1907 had a depressing influence upon the industries, but they soon recovered from the effects.

PENNSYLVANIA, University of, an institution of higher learning in Philadelphia, Pa. It was founded in 1740 and was first known as the College and Academy of Philadelphia, but in 1779 its present name was adopted. The institution owes much of its early prosperity to Benjamin Franklin, who spoke and wrote much in its favor. At present it maintains the college and school of arts, the laboratory of hygiene, the Wistar Institute, the Flower Astronomical

Observatory, and the departments of law, medicine, philosophy, archaeology, dentistry, and veterinary medicine. It has an endowment of about \$5,000,000, an income of \$650,000, and property valued at \$4,650,000. The library contains 475,000 volumes. The institution is nicely situated on a tract of fifty acres overlooking the Schuylkill River. It is attended by 9,200 students.

PENNSYLVANIA DUTCH, a name commonly applied to a German dialect spoken extensively in Pennsylvania and by the descendants from Germans who settled there in an early period. The people speaking this dialect immigrated chiefly from Germany, Switzerland, and Austria. They settled in large colonies, thus maintaining the original language, but mixing with it a number of words derived from the English and other languages. The dialect is not properly called Dutch, but was so named from the German word *Deutsch* (German). That it consists of merely a slight change of the words may be seen from the use of *bem* for *Bäume*, *bes* for *böse*, *bicher* for *Bücher*, *gfunne* for *gefunden*, and *schlof* for *Schlaf*. Considerable literature has been produced in this dialect, but most of it is poetic or of a religious character.

PENNY, a coin current in England, representing in value the twelfth part of a shilling. The name was derived from the Anglo-Saxon word *penig*, which corresponds to the German word *pfennig*. The English penny dates from the latter part of the 7th century, when it was coined under King Ina of the West Saxons, and was a silver coin weighing 21½ grains. It was made of copper previous to 1860, but is now made of bronze, containing one part of zinc, four parts of tin, and 95 parts of copper. The weight is 145.833 grains troy, and the value in metal is about one-fourth of its nominal value. The abbreviation is *d.*, being derived from the Roman coin *denarius*.

PENNYPACKER, Galusha, soldier, born in Chester County, Pennsylvania, June 1, 1844. He enlisted for service in the Federal army in 1861 as quartermaster sergeant, and in the same year reentered the Ninety-seventh Pennsylvania Infantry as captain. In 1865 he was commissioned brigadier general of volunteers, in 1866 he was appointed colonel, and in 1867 was brevetted major general of the United States army. He commanded the Sixteenth Infantry from 1869 until his retirement in 1883. During the war he took part in the operation along the Atlantic coast, participated in the Battle at Drury's Bluff and in the capture of Fort Harrison, and was present in the assault of Fort Fisher. He was twice wounded while in action, at Drury's Bluff and Fort Fisher. He died Oct. 1, 1916.

PENOBSCOT (pě-nōb'scōt), a river and bay in Maine. The river is the largest in the State. It rises by the West Branch in a small lake near the border of Quebec, flows southeast

into Penobscot County, where it joins the East Branch, or Seboois River, and thence flows toward the south into Penobscot Bay. The river furnishes an abundance of water power. It flows through a productive lumbering region, has a length of 300 miles, and is navigable for ships to Bangor. Penobscot Bay is an inlet from the Atlantic Ocean. It is about thirty miles long and twenty miles wide at its entrance, and contains a number of islands. Both the bay and river furnish excellent facilities for navigation and contain valuable fisheries. Among the chief towns on the Penobscot are Bangor, Belfast, Hampden, Old Town, Lincoln, and Medway.

PENSACOLA (pěn-sà-kō'là), a city in Florida, county seat of Escambia County, on Pensacola Bay, an inlet of the Gulf of Mexico. Communication is furnished by the Pensacola, Alabama and Tennessee and the Louisville and Nashville railroads. It is a port of entry, has an excellent harbor, and near it are forts Pickens and McRae. The city has steamboat connections with many trade emporiums and an extensive trade in lumber, cotton and woolen goods, coal, hides, tallow, fish, and supplies for the naval stores. Among the noteworthy buildings are the State armory, the county courthouse, the opera house, several fine schools and churches, and the United States government building. It has manufactures of cigars, clothing, earthenware, canned fish, and machinery. The public utilities include electric street railways, pavements, sewerage, a number of parks, and a public library. The city was founded by the Spaniards in the early part of the 18th century. General Jackson captured it in 1814 and five years later it became a permanent possession of the United States by virtue of the Florida Purchase. A fire destroyed much of the city in 1864, but it was soon rebuilt. Population, 1900, 17,747; in 1920, 31,035.

PENSION (pěn'shŭn), an allowance of money paid to a person who previously rendered services, or to the widow and children of a deceased person. Pensions are paid as periodical allowances or rewards for service rendered in a civil or military capacity. In a number of European countries they are granted to persons who have served the government in the time of peace for a specified length of time, whether in a military or civil capacity. In such cases the pension is not based on injury or disability, but wholly upon valued services covering a long period of time. However, there is the additional provision for the payment of pensions in case of injury or disability. Such laws are now maintained in England, Germany, and other countries to a modified extent. Canada had 2,651 pensioners in 1908 and paid out \$427,743.99 as pensions.

In the United States pensions are paid wholly upon injury or disability, but Congress has in many cases made special provision for persons

who were left in indigent circumstances after having served their country devotedly for a long time. Besides, a private or noncommissioned officer who has served 30 years may, on application to the President, be placed on the retired list and receive three-fourths pay for the remainder of life. The same privilege extends to commissioned officers who have been in the service 40 years and have reached the age of 65 years. In 1818 an act was passed granting all survivors of the Revolutionary War service pensions, in 1871 a like law was passed in relation to the survivors of the War of 1812, and in 1878 to the survivors of the Mexican War.

An act of Congress passed Aug. 26, 1776, established the pension system for disabled soldiers and sailors, but it has been amended and revised at numerous times, although the system in general is based on personal injury or disability. Invalid pensions range from \$24 to \$2,000 a year, this depending upon the degree of disability and the rank of the pensioner. In cases where both hands or both eyes are lost the pension is \$72 per month; total deafness, or the loss of a foot or hand, \$30; amputation of a limb at the hip or shoulder joint, \$45; and total incapacity for manual labor, \$30. Where the attendance and aid of others is required constantly, from \$50 to \$75 per month is paid. The widow of a deceased soldier, who would have been entitled to a pension of \$12 per month, receives an invalid pension of \$12 per month and an allowance of \$.2 for each child of the soldier under sixteen years of age, this being paid during her widowhood. Widows and children of deceased members of the life-saving service are entitled to pensions.

In 1890 a dependent pension law was passed. By its provisions all persons who served at least ninety days in the naval or military service of the United States in the Civil War, and who were honorably discharged, are entitled to pensions of from \$6 to \$12 per month in case of suffering from any permanent disease or disability not caused by vicious habits, whether or not such injury or disability is the result of disease or injury contracted while in the service. However, this was modified by the law of 1904, which entitles all veterans 62 years old to a pension of \$6; 65 years, \$8; 68 years, \$10; and 70 years, \$12 per month. The widow of a deceased soldier is entitled to receive \$8 per month, provided she has no means of support other than her daily labor and was married to the deceased soldier prior to the passage of the law, June 27, 1890. It is specially provided that an attorney presenting the claim for any pension is not entitled to more than \$10 in any case, and the penalty for violation is fixed at a fine of not more than \$500 and imprisonment for not more than two years, or both.

By an act of 1833 the pension business was established as a special bureau, and in 1849 it

became a bureau of the Department of the Interior. The President appoints the Commissioner of Pensions, who has the assistance of about 2,000 persons in the transaction and settlement of the pension business, and fully 3,000 surgeons are nominated in different sections of the country as examiners of applicants. Any one making false statements in relation to procuring a pension is liable to fine. Pensions are paid every three months, and there are agencies in different parts of the United States to distribute to pensioners the vouchers issued for them. Pension money due individuals from the government cannot be taken by garnishment or attachment. This is a provision of the national statute. In some states the money received as pensions and invested in securities or property of any kind cannot be taken by a court process in payment of debts without the consent of the pensioner.

At the close of the fiscal year ending June 30, 1917, there were 671,687 pensioners on the rolls. This is a notable reduction since 1902, when the number of pensioners in the United States was 999,446, the largest in the history of the pension bureau. The disbursements in 1905 were \$155,894,049.63, which were exceeded only in 1893, when the total amount paid to pensioners was \$161,774,372.36. The total disbursements in 1861-1918 inclusive were \$5,767,515,842.82.

Daniel F. Bakeman was the last survivor of the Revolution. He died April 5, 1869, aged 109 years, at Freedom, N. Y. Hiram Cronk, the last survivor of the War of 1812, died at Ava, N. Y., May 13, 1905, aged 105 years. Two pensioners are still on the roll for the Revolution, both being daughters of soldiers pensioned by special act. The report of the commissioner of pensions shows the following classification by wars June 30, 1917:

Revolution	2
War of 1812.....	109
Indian Wars	3,044
Mexican War	3,804
Civil War, widows.....	297,216
Civil War, invalids.....	339,226
Spanish War, widows, mothers, and invalids....	28,275
Great European War.....	11

PENTATEUCH (pĕn'tà-tūk), a term applied to the first five books of the Old Testament when spoken of collectively, these including Genesis, Exodus, Leviticus, Numbers, and Deuteronomy. The Jews apply to them the Hebrew name *Torah*, meaning the Law. Josephus was the first to mention the five-fold division. Many modern writers group these five books with the Book of Joshua under the term *Hexateuch*, since they form a continuous line of writing.

PENTECOST (pĕn'tê-köst), one of the three principal festivals of the Jews, held on the fifteenth day after the 16th Nisan, the second day of the Passover. It is celebrated as a thanksgiving for the ingathering of the harvest. Formerly two loaves of leavened bread made from new grain, called the *first fruits*,

were offered and the poor were remembered by liberal gifts. At present the Jews celebrate Pentecost two consecutive days and the name *Feast of Weeks* is used to some extent, since it follows the Passover after seven weeks. The Christians celebrate Pentecost in commemoration of the descent of the Holy Ghost on the disciples, occurring fifty days after Easter. The names Whit-Sunday and Whitsuntide are used to designate this day in England, from the circumstance that white garments were formerly worn by those upon whom baptism was conferred.

PENUMBRA (pĕ-nŭm'brà), in astronomy, an incomplete or partial shadow. In an eclipse, where the light is partly cut off by the intervening body, the shadow cast is called the penumbra. It occurs in a partial eclipse between the *umbra*, or *perfect shadow*, on all sides, and the full light. At the time of a total eclipse of the sun the observer is in the umbra. See **Eclipse**.

PEONAGE (pĕ'ōn-āj), a term variously applied to different countries, but usually to describe a system of servitude in Spanish-American countries. The *peon* of Mexico was in early colonial times placed under bondage to serve his creditor until the debt was paid and, by reason of limited wages and a system of loaning money to the peons, it often became necessary for several generations to labor before the obligations could be complied with. A law of Congress, in 1867, abolished peonage in New Mexico, where it had been introduced from Mexico, and it has since been abolished in some of the countries of South America, though in others it still remains as a system not unlike perpetual servitude.

PEONY (pĕ'ō-nŷ), a genus of plants of the crowfoot family. They are cultivated extensively in gardens and for ornamental purposes. The species include a half shrubby plant native to Eastern Asia and Japan, where it attains a height of about twelve feet, and bears beautiful whitish flowers with pink markings. Other species are of the herb order, having deeply lobed leaves and perennial tuberous roots. The *Siberian peony* bears a double white flower, the peony native to Switzerland has double crimson or white flowers, and the Russian peony is fern-leaved; all these belong to the herbs. Emetic and cathartic properties are found in the seeds and roots. Formerly the common peony was held in repute for its medical properties, though at present it is not so regarded.

PEOPLE'S PARTY, a political organization formed in the State of New York in 1824 by a wing of the Democratic party, which favored choosing the electors by a direct vote of the people. They supported William H. Crawford for President, who received 41 votes in the electoral college. In 1891 the farmers' alliances, the labor and granger organizations, and the greenback party organized the People's party

that was prominent in the election of 1892 and several subsequent elections. Afterward it became generally known as the *Populist* party. James B. Weaver, of Iowa, was the nominee for President in 1892, receiving 1,030,128 popular votes and 23 votes in the electoral college. In 1896 and 1900 the party supported William J. Bryan, the nominee of the Democratic party, for President. Among the principal issues advocated by the People's party are included the abolition of national banks, the issuance of money direct by the government, the payment of all government obligations in any kind of lawful money, the establishment of postal savings banks, bimetallism, an income tax, the election of United States senators by direct vote of the people, and opposition to all forms of monopoly harmful to industrial and commercial enterprises.

PEORIA (pě-ō'rī-à), a city of Illinois, county seat of Peoria County, on the Illinois River, 162 miles southwest of Chicago. It is on the Iowa Central, the Illinois Central, the Chicago and Alton, the Lake Erie and Western, the Chicago, Burlington and Quincy, the Chicago and Northwestern, the Chicago, Rock Island and Pacific, and other railroads. The site covers an area of ten square miles and borders on the outlet of Lake Peoria, an expanse of the Illinois River. It is surrounded by a rich agricultural and bituminous coal-mining country. Bradley and Glen Oak parks are fine public resorts. Among the principal buildings are the city hall, the public library, the high school, the Hotel Jefferson, the federal buildings, the county courthouse, the Coliseum, the Y. M. C. A., and the House of the Good Shepherd. It has the Spalding Institute, the Bradley Polytechnic Institute, and a soldiers' monument.

Peoria is well built, much of the architecture being of brick and stone. Intercommunication is by an extensive system of electric railways, with branches to many towns and interurban points. Much of the paving is of brick and asphalt. The public utilities include gas and electric lighting, systems of sewerage and waterworks, and fire and police departments. It is noted as a jobbing and wholesaling center. Distilling is the most important industry, producing annually about 35,000,000 gallons of spirits. Other manufactures include jewelry, soap, carriages, trunks, watches, farming machinery, hardware, monuments, automobiles, oatmeal, tobacco products, brooms, and stoves. In 1680 a post was established on its site by La Salle, who named the place Fort Crevecoeur. The first permanent settlement was made in 1819 and it was incorporated as a city in 1844. Population, 1900, 56,100; in 1920, 76,121.

PÉPIN LE BREF (pě-păn'), the youngest son of Charles Martel and father of Charlemagne, born in 714; died in September, 768. In 741 Charles Martel gave him as a heritage Burgundy and Neustria, while his elder brother,

Carloman, received Thuringia, Swabia, and Austrasia. Their reign was largely influenced by the Merovingian sovereign, but in 751 Pépin became King of the Franks, succeeding Childeric, the last of the Merovingian kings. In 755 he invaded Italy as an ally of Pope Stephen III. for the purpose of expelling the Lombards, and soon after established the temporal sovereignty of the Pope by making him ruler of Ravenna. His two sons, Charlemagne and Carloman, received the territories of Pépin under a division at his death. Pépin was not only an active and enterprising military commander and civil ruler, but he was the sovereign who united the Gallic nation. His surname, meaning *The Short*, was given to him because he was short in stature, but he was noted for his physical strength.

PEPPER, a class of plants native to the East Indies, but now extensively naturalized and cultivated. These plants include a large number

of species, but the most important is the black pepper, or common pepper. This is a climbing plant. It bears broad ovate leaves and globular berries, the latter being of a bright reddish color when ripe, for which it is grown in fields and plantations. Poles or



PEPPER.

other supports are provided for the plants, which bear fruit in three or four years, and the berries are picked when beginning to turn red. Their color afterward becomes black and the berries shrivel in drying, when they constitute the common or black pepper sold in the market. Two crops are secured each year, the plants yielding about ten pounds of pepper berries annually for eight to twelve years. This product constitutes one of the most valuable and extensively used of the spices. Black and white pepper are made from the same berries. In order to secure white pepper, the berries are soaked in water before grinding and the outer covering is rubbed off. Formerly pepper was of an extraordinarily high price, but since the early part of the last century its cultivation has been greatly extended and the price became correspondingly cheapened. Sumatra, Java, and Malacca are the most productive regions at present, but pepper culture has been introduced in the West Indies and other tropical sections of the Western Hemisphere.

PEPPER, William, educator and author, born in Philadelphia, Pa., Aug. 21, 1843; died July 28, 1898. In 1862 he graduated from the art department of the University of Pennsylvania and two years later from the medical department of the same institution, where he was made a professor of medicine. He was elected provost of the university in 1881, but resigned

in 1894. Pepper lectured and wrote extensively on historical, philosophical, and scientific subjects. In 1891 he was president of the American Association of Physicians and in 1893 of the Pan-American Medical Congress at Washington. He published "Sanitary Relations of Hospitals" and "System of Medicine by American Authors." In 1870 he founded the *Philadelphia Medical Times*.

PEPSIN (pěp'sin), a digestive compound contained in the gastric juice of the stomach. It possesses the power, when united with hydrochloric acid, to dissolve the otherwise insoluble proteids and to convert them into peptones. Pepsin is a ferment. It is soluble in water, weak spirits, and glycerin, and its function is to render soluble and diffusible substances that would otherwise be indigestible to a considerable extent. When the food has been dissolved under its influence, it forms a grayish liquid called *chyme*. Both pepsin and hydrochloric acid are secreted by the stomach, and the vigorous action of that organ depends upon the proper production and union of the two. The exact nature of pepsin is not known, but it constitutes an essential element in the digestive process, and forms ordinarily about eighty per cent. of the composition of the gastric juice. Pepsin is obtained from the stomach of the calf, pig, and other animals, and is used largely in the medical practice as a stimulant in cases of disorganized digestion. A commercial product known as *pepsina porci*, obtained from the stomach of the pig, is considered the best. The pepsin of the market is a light yellowish powder, which enters as a constituent into most of the digestive preparations. Alcohol impairs the activity of pepsin, but this is compensated for, at least partly, by its stimulating influence.

PEPTONE (pěp'tōn), a proteid soluble in water and not coagulable by heat. Peptones are produced in the stomach during the process of digestion. It results from the action of the pepsin contained in the gastric juice upon the nitrogenous elements. See **Proteids**.

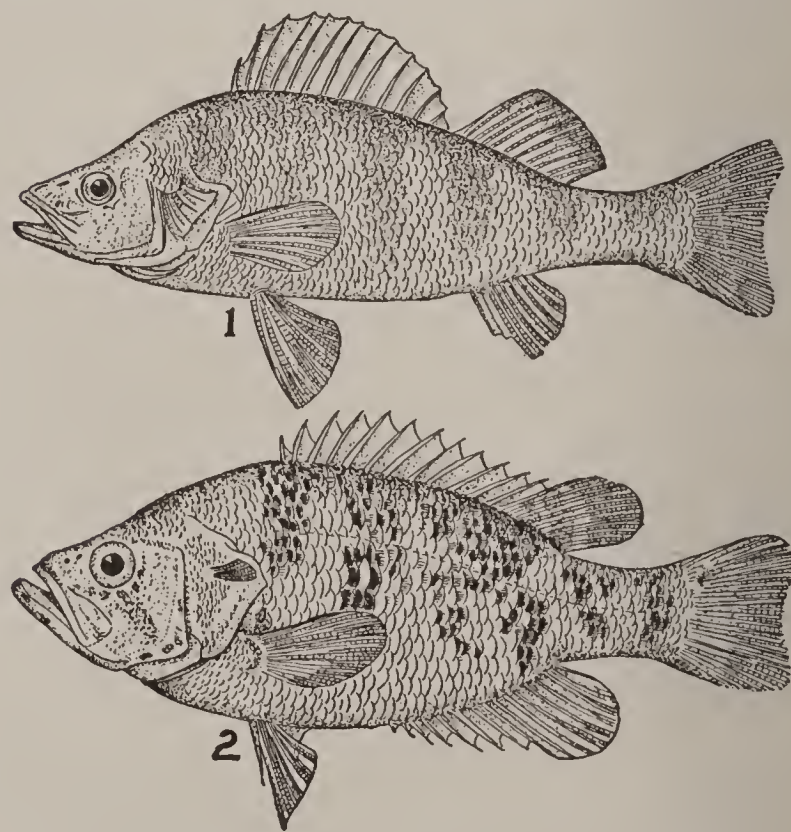
PEPYS (pěps), **Samuel**, diarist, born in London, England, Feb. 23, 1633; died May 26, 1703. He studied at Magdalene College, Cambridge, and held various positions in the government, including secretary to the admiralty under James II. In 1679 he was imprisoned on a charge of plotting to destroy the Protestant religion, and was again arrested ten years later for being a Jacobite. His literary work, known as Pepy's "Diary," is valuable in that it covers many details of court life in England from 1660 until 1668. It was kept in shorthand and gives instructive information about the everyday life in the times of the later Stuarts.

PEQUOTS (pě'kwōts), or **Pequods**, a tribe of North American Indians, belonging to the Mohican family, first met with in Connecticut. In 1634 they entered into a treaty with the colonists at Boston, but soon after became hostile,

and in 1637 were defeated near the present site of Groton, Conn. The struggle against them continued for a number of years, resulting in great loss of life, but they were finally subdued in a battle at Fairfield Swamp. Shortly after they became widely scattered or were sold as slaves. At present the tribe is assimilated in part by other tribes, but a few of the descendants are found in Wisconsin, mostly at Green Bay.

PERCEPTION (pěr-sěp'shūn), the faculty of the mind by which we gain knowledge, through the senses, of the existence and properties of matter. It is the power that the mind has of cognizing external objects and their qualities. Perception differs from *conception* in that it deals with things having an actual, not merely a possible, existence, and from *consciousness*, in that it is concerned with objects external to the mind. Writers have employed the term in various relations, and it is now sometimes applied to the act and product of perception as well as to the power of perceiving. Perception is both direct and acquired, since what the mind perceives through one sense enables us to know certain facts resulting at least in part from former experience of the different senses.

PERCH, a genus of fish which includes many species, found widely distributed both in salt and fresh water. They are especially abundant



1, YELLOW PERCH. 2, SACRAMENTO PERCH.

in the northern part of the United States and Canada and are found in the ponds, rivers, and lakes of the northern part of Europe and Asia. The common fresh-water perch has a broad body flattened laterally, and two dorsal fins supported by strong bony spines. The color at the upper parts is greenish-brown. Blackish bands mark the sides and at the lower parts the color is a goldish-yellow. From one to three pounds is the usual weight. The perch feeds

on smaller fishes, worms, and insects. It is fond of still waters. A species known as the *Sacramento perch* is found in the waters of California. The *yellow perch* common to the fresh waters of Canada and the United States is a favorite food fish and may be easily propagated in artificial lakes and ponds. It seldom nibbles at the bait, but bites quickly at hooks baited with worms or minnows.

PERCIVAL (pěr'sī-vaĭ), **James Gates**, poet and geologist, born in Kensington, Conn., Sept. 15, 1795; died in Hazel Green, Wis., May 2, 1856. He graduated from Yale University in 1815. After teaching school and studying medicine, he began a successful practice in Charleston, S. C. In 1824 he became professor of chemistry and surgery in the United States Military Academy, but soon after received an appointment as surgeon in the recruiting service at Boston. In the meantime he contributed a number of articles to the *United States Literary Magazine*, published several volumes of poetry, and studied geology. He was made geologist and mineralogist of Connecticut in 1835 and in 1854 became geologist of the State of Wisconsin, where he afterward surveyed in the lead region for several mining companies. His principal works include "Prometheus," "Clio," "The Dream of a Day," and "Collection of Poems." He is the author of several valuable geological reports.

PERCUSSION (pěr-kűsh'űn), in medicine, a method of detecting certain diseases of the chest and vital organs by means of tapping, or gently striking, the surface of the body. The object is to ascertain the presence or absence of air and fluid in certain internal organs, or to determine the comparative density of the subjacent parts by the nature of the sound. The tapping is sometimes done with the fingers or a small hammer tipped with India rubber, and the test is made on the surface of the body just above the place to be investigated. An instrument known as a *pleximeter* is sometimes used, and this is struck either with the fingers or a hammer. In some cases the *stethoscope* is employed in connection with percussion, when it is said to be *auscultatory percussion*. See **Auscultation**.

PERCY, the name of a celebrated Norman family, which descended from William de Percy, who came to England with William the Conqueror in 1066. This sovereign granted him large tracts of land in the north of England, where his family held vast possessions for many ages afterward. The house of Percy is the most distinguished of all the noble houses of England. It is alike remarkable for its culture of arts and letters and for its long, unbroken line. In 1766 the present dukedom of Northumberland was created in the Smithson family, which assumed and still bears the name of Percy.

PEREZ GALDÓS (pă'răth găl-dôs'), **Ben-**

ito, novelist, born at Las Palmas, in the Canary Islands, in 1845. He studied in his native town and at Madrid, where he completed a course of law. His first publication was issued in 1871 under the title "La Tontana de Oro," a historical romance relating to Spanish history. In this work and one entitled "El Audaz," he gives an account of the invasion of Spain by Napoleon and the tyranny of Ferdinand VII. His writings have been widely read both in Europe and in Spanish America. Besides producing many popular novels, he is the author of a number of plays, though they are inferior to his other writings. Among his publications are "Gloria," "Doña Perfecta," "El doctor Centeno," "Angel Guerra," "La familia de León Roch," and "Episodios nacionales."

PERFECTIONISM (pěr-fěk'shűn-iz'm), the doctrine that perfection is attainable in this life. When that state is reached, the believer is presumed to be freed from the responsibility for sin. Those holding this view generally agree that the soul becomes united with God by contemplation and devotion until all that is sinful in it is annihilated, when it participates in the divine protection. However, they do not assume superiority of goodness over others, since their condition is due to the work of grace, and they are free from sin and guilt in that they do not consent to be led astray by temptations. Most of the advocates of this doctrine hold that it is a state of growth in which the soul may maintain perfection and progress in developing into consecutively higher states, thus making the early stage only a beginning of growth in grace. The Anglican, Lutheran, Roman Catholic, and many other churches hold that no one can live absolutely without sin, except by divine grace. That perfection is a state equivalent to *sanctification*, and not for the complete achievement thereof, was first held by the German Mystics and became a tenet of the English Methodists. This is in effect the view held at present by the Friends, certain Methodists, and several other sects, and it is generally termed *entire sanctification*, meaning complete consecration of soul to God. Protestant churches generally deny the attainment of perfection in this life and hold that the progressive process of sanctification cannot be completed in this world, thus teaching the need of daily prayer for the forgiveness of sin by every Christian.

PERFECTIONISTS, Bible Communists, or Free Lovers, an American religious sect founded in 1848 by John Humphrey Noyes. The organizer was born at Brattleboro, Vt., Sept. 6, 1811. He was first a clerk in a law office and later was admitted to the bar. Subsequently he practiced his profession for some time at Putney, Vt. In 1831 a religious revival spread in the New England states and he became a Congregational minister. Soon after he separated from that church, claiming to have experienced a second conversion, and be-

gan organizing a sect with the view of restoring ideal primitive Christianity.

The first church organized as a community was at Putney, but soon after it was removed to Oneida, N. Y., and another was established in the vicinity of Wallingford, Conn. Among the teachings are community of labor and its fruits, that communication with Christ provides a relief from disease, sin, and death, that all must be reconciled with God to secure salvation, that man and woman must be recognized on the equality of brotherhood, and that faith in God is the necessary element in securing salvation. Perfectionists were originally organized in a family, in which fixed marriage ties were not recognized, but in 1880 the ordinary family relationship by marriage was established. Noyes died at Niagara Falls on April 13, 1886, and since then many property and other reforms have been effected by the members.

PERFUMES (pēr'fūnz), the fragrant substances which are prepared to emit pleasant odor. They are used on the person or in the dwelling to fill the air with an agreeable scent. The manufacture of perfumery dates from remote antiquity. It was a common art among the peoples of Assyria, Babylonia, Egypt, Phoenicia, and Palestine. The Grecians and Romans developed the manufacture of perfumes into an important industry. During the Middle Ages the enterprise spread to Western Europe. Two classes of perfumes are recognized in arts and trades, those derived from an animal and those from a vegetable origin, and they are known in the market as crude and prepared. *Crude* perfumes are secured from animals or plants and are not mixed as special preparations, while *prepared* perfumes are sold under special names, being mixed according to particular formulae. Many classes of prepared perfumes are now sold on the market, some business houses manufacturing several hundred kinds.

Perfumes of animal origin include musk, ambergris, hartshorn, civet, and castor. *Musk* is the most important of these, since it has the most permanent scent. It is used largely in the preparation of commercial perfumes, and serves in that capacity to add durability and intensity to the fragrance of many sweet-smelling preparations. The vegetable perfumes include a large variety. They are made from flowers, as the violet, rose, and tuberose; from different kinds of wood, as sandalwood, sassafras, and cedar; from various fruits, as the lemon, orange, and bergamot; from seeds, as dill, caraway, and aniseed; from spices, as the cloves, nutmeg, and cinnamon; from herbs, as the peppermint, lavender, and rosemary; from nuts, as vanilla and bitter almonds; from roots, as orris root; and from gums, as the styrax, camphor, and myrrh. Some of the vegetable perfumes are secured from plants and trees, from which they exude naturally, or are obtained from wounds inflicted artificially in the bark of wood. These

include the gum resins, as benzoin, myrrh, and camphor.

Most of the vegetable perfumes are procured in the form of essential oils by distillation. These perfumes were formerly called *quintessences*, but now they are generally termed *ottos*, from the Turkish term *attar*, a word associated with the rose. Distillation involves the simple process of placing the fragrant product of the plant in a still of tinned copper, where a quantity of water is added. A small furnace underneath supplies the heat, and, when the water boils, the odorous parts are carried into the worm with the steam. Afterward decanting is employed to separate the odoriferous parts from the steam or water that may have formed. Roses are gathered for distilling about the first of June and are placed in cool cellars until they can be distilled. All the roses of the harvest are distilled by a single process, when the product forms only *rosewater*, which is distilled a second time. The product now includes the sweet-smelling, oily attar in the form of little globules, but still contains a quantity of water. By placing it in small vessels, the oily attar comes to the top and is separated from the water by dipping it with a spoon. The otto of roses is the most expensive perfume on the market, and the higher grades made of selected rose petals sell at \$500 per pound. Two other processes for extracting perfumes, known as *enfleurage* and *maceration*, are employed to some extent.

The process known as *enfleurage* consists of putting a layer of grease, such as suet or lard, in a small box and placing the fresh blossoms of flowers on the grease. The box is carefully closed and allowed to stand about 24 hours and fresh flowers are added every 24 hours for several weeks, when the fat becomes filled with the perfume of the flowers and, after melting and straining, it is ready for use. The process of *maceration* consists of placing flowers in oil or melted fat for a few hours, when the fat is heated and the flowers are strained out. New flowers are added from time to time until the grease is highly perfumed, when the product is bottled for use, or the oil may be melted and combined with alcohol, by which volatile oil is brought to the surface. It is then skimmed off the surface and bottled. Such flowers as the tuberose and jasmine are injured by heating and their perfumes are extracted by *enfleurage*, while in some cases both processes are employed. The manufacture of perfumes is an extensive industry in France, Germany, England, and many cities near the Mediterranean. Lavender is produced in large quantities in England, Nice leads in the production of violet and mignonette, and Cannes is a center for manufacturing perfumes from the jasmine, rose, and tuberose. The principal manufactures in America are the middle and New England states, but growing interests in the prepara-

tion of perfumes are developing on the Pacific coast.

PERGAMUS (pēr'gà-mŭs), or **Pergamun**, an ancient city of Asia Minor, in Mysia, fifteen miles from the mouth of the Caicus River. It is thought that the city was founded by Arcadian colonists under Telephus, son of Hercules. In the time of Alexander the Great it was selected as the treasury of the Grecians and Phil-etaerus, in 280 B. C., made it the capital of an independent kingdom. The Romans acquired complete control of the kingdom, converted it into the province of Asia, and made it a great center of commercial activity and military influence. It was one of the principal seats of worship, and invalids flocked there to obtain advice from its deities and priests. At that time it had a public library second only to the library of Alexandria, but the city began to decline when it came under the influence of the Byzantine emperors. It is now known as Bergama and is noted for its ruins of ancient palaces, temples, aqueducts, and walls.

PERI (pēr'ī), a being mentioned in Eastern legends as immortal, but who is excluded from Paradise. He is said to have descended from fallen spirits, and was thought to occupy a position midway between angels and demons. Many interesting fables mention peris in various relations, and belief in them is enjoined upon the Mohammedans by the Koran. Generally both grace and beauty are attributed to spirits of this class, when they are represented as female, though generally they are regarded as both male and female. When spoken of as male beings, they personify strength and skill in administering to the wants of mankind.

PERICARDIUM (pēr-ī-kār'dī-ŭm), the name of the sac which surrounds the heart. It is conical and membranous and consists of two layers. The *external* layer has many interlacing fibers, which, at the upper end, are closely interwoven with the external coats of the larger blood vessels, while the *internal* layer is composed of serous, lining membrane. A thin lubricating serous fluid is secreted by the pericardium, which serves to prevent friction and facilitates the movement of the heart.

PERICLES (pēr'ī-klēz), famous statesman of ancient Greece, son of Xanthippus, born at Athens about 494; died in 429 B. C. His father won the celebrated Battle of Mycale over the Persians in 479, thus giving the family a high repute among the Hellenic people. Pericles secured a liberal education under the master teachers of his time, among them the philosopher Anaxagoras. He not only possessed extraordinary ability as a student, but became distinguished for patriotic devotion to country, eloquence, and dignity of manners. His rise into prominence was rapid, notwithstanding his advocacy of the reasonable view that laws must be enacted and enforced for the general interest of the people instead of particular classes.

Though he lived plainly as a private citizen, it was possible by his force of eloquence and genius to shake the policy of the state. It was his desire that Athens should remain the most powerful political influence in Greece and that the people themselves should wield the power in Athens.

He placed full confidence in a government by the masses, and depended upon securing the popular support of the people in the interest of just measures by disseminating knowledge in education and educational arts. Accordingly he utilized every means available to bring the common people in touch with the best education attainable, and provided a revenue whereby they could afford to sit as jurors and attend the assembly to listen to public discussion. Magnificent public buildings were erected under his direction, both for the entertainment and education of the populace. They were adorned with the noblest historical paintings and the dialogues of Euripides, Aeschylus, and Sophocles were performed free before the multitude. He encouraged philosophers, artists, poets, and orators in such a manner that his time is spoken of as the *Age of Pericles*, because in it Hellenic civilization reached its finest blossom and fruitage.

Pericles represented the democracy, while Cimon was the leader of the nobles and commander of the army. In 461 B. C. the latter was exiled under pressure from the common people and Pericles accordingly became the central figure of the Athenians, but Cimon was recalled four years later with the understanding that he should command the army in foreign countries, while the affairs in Greece should be left to Pericles. The enterprise of the Athenians may be realized in their extensive improvements at home and the vast military operations abroad, conducting in a single year, in 457 B. C., wars against Egypt, Cyprus, Phoenicia, Aegina, and the coast of Peloponnesus. With the death of Cimon, in 449 B. C., Pericles became almost the sole authority in affairs of state, but this he continuously exercised in the interest of democracy. Thucydides, son of Milesias, succeeded Cimon as the head of the aristocratic party, but he was exiled in 444. Pericles established such general confidence in his ability that he remained the central influence in Athens to the end of his life, and his rule became one of unexampled prosperity. At that time lived in Athens the celebrated poets, Euripides, Aeschylus and Sophocles; the philosophers, Socrates, Anaxagoras, Zeno, and Protagoras; the astronomer, Meton; and the painters, Myron and Phidias.

In the latter part of his life Pericles turned his attention to the policy of uniting the Grecian states into one political union, but the jealousy of Sparta brought on the Peloponnesian War, in 431. In the long contest that followed Athens was supported by the Ionians and the democracy, while Sparta was aided by the

Dorians and the aristocracy. A very disastrous plague spread over Athens in the second year of the war. Among the thousands of people who died were the two sons of Pericles, Paralus and Xanthus. Pericles succumbed to the disease about a year afterward. His sudden death was the greatest loss of all, since no statesman of recognized ability was left to guide the people. Pericles was generous in the management of public affairs, and, being richly endowed by nature with the higher qualities of manhood, he responded to all that was beautiful and noble in literature and art. Among the many structures erected in accord with the policy of improvement advocated by him were the Odeum, the Parthenon, and the Propylaeum. Under his direction Athens became the center of art, science, and inventive skill, and its commerce and material industries became developed on a highly flourishing scale. Pericles is not only the type of the ideal spirit of his own age, but of antiquity. He is represented of graceful form, but with an unusual height of forehead, while his lips were full and the nose of straight Grecian form. He was buried among the great dead at Ceramicus. Thucydides spoke of him as "powerful from dignity of character as well as from wisdom."

PERIM (pâ-rēm'), a barren and destitute island in the Strait of Bab-el-Mandeb, near the entrance to the Red Sea, about two miles from the Arabian shore and nine miles from Africa. The island is four miles long and two miles wide. It has an area of seven square miles. The general elevation is 245 feet above the sea. It is important as a strategic position in the Red Sea. Since 1857 it has been a possession of the British, who maintain a lighthouse and coaling station. It is governed as a dependency of Aden. Anciently it was called Diodori Insula.

PERIODICAL (pē-rī-ōd'ik-əl), a publication issued at regular intervals, such as a magazine or newspaper. Periodicals are devoted either to the circulation of news or the promotion of knowledge in literature, arts, science, or the industries. The term is variously applied to different publications appearing at regular intervals, though not generally to daily newspapers. Such publications as *The Strand Magazine*, *The Pall Mall Gazette*, *The Cosmopolitan*, *The North American Review*, and *The Review of Reviews* are representative English and American periodicals. A periodical devoted principally to general criticism is called a *review*, and one having contents of a miscellaneous or entertaining character is known as a *magazine*. In North America and many countries of Europe the several classes of periodicals are not closely specialized, but in Germany they are confined quite carefully to particular lines, and are published with the view of meeting consistently the taste of particular readers. Most of the publications of America are of a miscellaneous

character and are designed to meet the wants of many classes, though some are quite closely confined to the individual needs of certain professions, trades, and occupations. See **Journalism**.

PERIPATETIC PHILOSOPHY (pēr-ī-pā-tēt'ik), the school of philosophy originated by Aristotle and supported by his followers, so named from the building in which the founder lectured. According to others, it is so called because the founder was accustomed to walk while he lectured to his disciples. It is concerned very little with metaphysics, but, instead, seeks to popularize the study of ethics through contact with nature. Happiness is held to be the highest good. Virtue, which consists in the practice of justice, bravery, generosity, and temperance, is the essence of willingness to practice what conforms to reason. While man is made better through his association with nature, the practical ends of life cannot be attained without the political state, of which organized society is the basis. The teachings of Aristotle were modified to some extent by his followers, chiefly in the direction of naturalism, especially by Theophrastus, who was at the head of the school for a number of years. He was succeeded by Strato of Lampsacus in 288 B. C. As a school of philosophy it continued long after the decline of Grecian power, until the ascendancy of Augustus.

PERJURY (pēr'jû-rÿ), the crime of willfully making a false statement while under oath or affirmation, or willfully giving false testimony material to the issue or point in a case at law. To constitute perjury, the oath or affirmation must be lawfully administered, the false swearing must be willful and corrupt, the matter sworn to must be material to an inquiry or investigation, and must be before an officer created by law or in a proceeding in a court of justice. In some states the act of making an affirmation about a matter in regard to which a witness has no knowledge is held to be perjury. The punishment provided is by fine or imprisonment, or both, and in most cases the maximum imprisonment fixed is ten years.

PERKINS, Eli. See **Landon, Melville De Lancey**.

PERNAMBUCO (pēr-nâm-bōō'kô), or **Recife**, a city in northeastern Brazil, capital of a state of the same name, on the Atlantic coast. It is situated near the mouth of the Beberibe River and consists of three parts, Boa Vista, on the mainland; Recife, on a small peninsula; and San Antonio, on an island. Recife is the principal seat of commerce, but is connected with the other parts by a number of bridges and causeways. The city has broad and well-improved streets, an excellent harbor, and a lighthouse. It is defended by strong forts. Among the improvements are several public parks, waterworks, pavements, public lighting, and electric street railways. The principal buildings include an Episcopal palace, the public court-

house, the customhouse and post office, several educational institutions, and the central railroad station. Pernambuco is the most extensive sugar market of Brazil. It has a large export and import trade in manufactures, farm produce, and live stock. The manufactures include tobacco, cigars, clothing, leather, dyes, implements, sugar, machinery, and earthenware. It has many elevators, warehouses, and railroad machine shops. The place was founded in 1504 and was captured by the Dutch in 1630, but was retaken by the Portuguese in 1654. Population, 1918, 173,482.

PERPETUAL MOTION (pěr-pět'û-əl), a motion which, being once generated by mechanical means, continues perpetuating itself indefinitely. The problem of inventing machines to move perpetually was studied in different countries as early as the 13th century. When the conservation of energy was discovered, it became apparent that the hopes of ambitious inventors to construct a machine which, once set in motion, would perpetuate its movement without drawing on any external source of energy, were vain and delusive. The Academy of Science in Paris as early as 1775 refused to further entertain schemes that claimed to have overcome the impossibility, and henceforth considered the problem equally absurd with the duplication of the cube and the quadrature of the circle. No combination can produce energy; it can only direct the energy imparted.

If a body could be set in motion where it would not be exposed to friction or fluid resistance, it would continue to move forever. However, friction occurs as soon as a moving body comes in contact with the air or with other bodies, and by it the motion must be eventually overcome. Even if conditions existed whereby a body could be induced to move perpetually, such a machine would be useless, for the reason that the quantity of energy possessed by it would be limited to the energy applied to start the device, and if it were employed to do any work or impart motion to other machines, it would cease moving as soon as it had expended an amount of energy equal to that imparted to it in the beginning. Many patents have been issued to persons claiming to have invented devices by which perpetual motion was secured, but in every case it was shown successfully that the mechanical structure was useless and the originator was ignorant of the basic principles of philosophy. Among the favorite contrivances are the overbalancing wheel; a device in which a system of weights slide to produce continuous movement; wheels having iron attached which are to be attracted by magnets; and masses of liquid moving within a mechanical device.

PERPIGNAN (pâr-pên-yän'), a city of France, capital of the department of Pyrénées-Orientales, 35 miles south of Narbonne. It is on the Tet River, five miles from the Mediter-

ranean, and has railway communication with the leading cities of France. Situated near the eastern extremity of the Pyrenees, at a convenient passway from Spain into France, it is strongly fortified and garrisoned. The streets are regularly platted and well improved, but many of the buildings are Moorish in construction. Among the chief buildings are the Cathedral of Saint Jean, the university, the city hall, and a college. In the vicinity are many fine orchards and vineyards. Paper, furs, machinery, corks, and woolen clothes are the chief manufactures. The city was long a possession of the kings of Aragon and of Spain, but was united to France in 1659 by the Treaty of Pyrenees. Population, 1916, 38,868.

PERRAULT (pâ-rō'), **Charles**, eminent author, born in Paris, France, Jan. 12, 1628; died May 16, 1703. He was the son of an advocate, received a liberal education, and in 1651 was admitted to the bar at Paris. He practiced law for several years and afterward became controller-general of the royal buildings. After producing a number of literary treatises, he was admitted to the French Academy. Soon after he became involved in controversies regarding literary criticisms, in which many of the learned men of France became interested. Perrault is not famous so much for the invention of the subjects of his writings, which consist largely of fairy tales, but in adapting them to a literary style of much beauty and childlike fancy. The principal writings of this character embrace "Bluebeard," "Little Red Riding Hood," "Sleeping Beauty," "Puss in Boots," "Hop o' My Thumb," "Cinderella," and "Riquet of the Tuft." He is the author of 200 critical biographies. His "Memoirs" were published at Avignon in 1759.

PERRY, a city in Oklahoma, county seat of Noble County, thirty miles northeast of Guthrie, on the Atchison, Topeka and Santa Fé and the Saint Louis and San Francisco railroads. The surrounding country is fertile, producing cereals, fruits, and grasses. It has electric lighting, waterworks, and a growing trade in merchandise. The chief buildings include the county courthouse, the high school and a number of churches. It has flouring mills, cigar factories, grain elevators, and other industries. Population, 1900, 3,351; in 1920, 3,154.

PERRY, Arthur Latham, educator and author, born in Lyme, N. H., Feb. 27, 1830; died July 13, 1905. In 1852 he graduated from Williams College, Massachusetts, and two years later became professor of political economy and history in that institution. He contributed to several journals in the interest of free trade and debated that question with Horace Greeley before audiences in Boston, New York, and other cities. His writings include "Foes to the Farmers," "Elements of Political Economy," "Williamstown and Williams College," and "International Commerce."

PERRY, Matthew Calbraith, naval officer, brother of Oliver H. Perry, born at Newport, R. I., April 10, 1794; died March 4, 1858. He became a member of the navy in 1809 and took part in the War of 1812, after the close of which he engaged in the merchant service. In 1819 he reëntered the navy, was made an officer on the African coast, and later took part in a warfare against piracy in the West Indies. He received the rank of commander in 1826 and subsequently was made superintendent at the Brooklyn navy yards, where he supervised the building of the *Fulton*, which was the first steam vessel in the navy of the United States. He had command of this vessel and for some time had charge of the squadron sent by the United States to suppress the slave trade on the African coast. At the beginning of the Mexican War, in 1847, he had command of the American fleet. In 1852, under an appointment by President Fillmore, he sailed to Japan to conclude a commercial treaty with that country, and by this means opened up extensive commercial relations. Returning to the United States by way of Europe, he was the first American to circumnavigate the earth.

PERRY, Oliver Hazard, naval officer, born in Newport, R. I., Aug. 23, 1785; died at Port of Spain, on the island of Trinidad, Aug. 23,



OLIVER H. PERRY.

1819. He entered the United States navy as midshipman in 1799, became lieutenant in 1807, and in 1812 was transferred from a command on the Atlantic coast to do duty on Lake Erie under Commodore Isaac Chauncey. On Presque Isle (now Erie) he was chosen to superintend the building of a number of small vessels. His squadron fitted up in this manner consisted of nine vessels, with which he attacked the British fleet under Captain Robert Barclay, who had a flotilla of six vessels of larger size. The squadron under Perry sailed from Put-in-Bay on Sept. 10, 1813, and on the same day he gained a victory over the British, capturing the entire flotilla. His announcement of the event to the government was his famous dispatch: "We have met the enemy and they are ours." Perry was accorded a vote of thanks by Congress and the rank of captain was conferred upon him. This victory was important because it caused the British to lose control of Lake Erie and they were compelled to evacuate Detroit. Subsequent to the war he served in the Mediterranean and in 1815 commanded a squadron in the Caribbean Sea. His death occurred from yellow fever, after returning from a trip up

the Orinoco River. A fine statue of Perry was erected at Cleveland, Ohio, in 1860. Citizens of Newport erected a bronze statue opposite his old home. It is a fine bronze production by William G. Turner and was unveiled on Sept. 10, 1885.

PERRYVILLE, Battle of, an engagement of the Civil War in the United States, fought at Perryville, Ky., on Oct. 8, 1862. General Bragg had a Confederate force of 17,000 men and made an attack upon a Federal force of 22,000, under command of General McCook. The latter were at first driven back, but they finally compelled the Confederates to retreat through Perryville, and during the night they retired from the field. The engagement was a strategic victory for the Federals, although it is usually looked upon as a drawn battle. A loss of 3,450 men was sustained by the Confederates, while the Federals lost 4,200 men.

PERSEPOLIS (pēr-sēp'ō-līs), a city of ancient Persia, which is famous for its former importance and the remarkable ruins on its site. It was located in a fertile valley near the confluence of the Medus (now Polwar) and the Araxes (now Bendemir) rivers, about 35 miles northeast of Shiraz. Persepolis is the Grecian name, its Persian name being now unknown. The city was one of the capitals of Persia. Its founding is ascribed to Cyrus, though some writers think it was not the capital until many years after the time of that eminent Persian, and that it became the residence of Darius, Xerxes, and Artaxerxes. Many of the leading monarchs of Persia were buried here. On its site are many remains of marble columns, bas-reliefs, huge figures, walls, and other notable ruins. Both history and the extent of its ruins indicate that the city at one time possessed vast wealth and great magnificence. Alexander the Great destroyed the city in 331 B. C. to demonstrate to the people of Asia his great military power. Tourists find much of beauty and interest at its site.

PERSEUS (pēr'sē-ūs), in Greek legend, the son of Zeus and Danaë, daughter of Acrisius, King of Argos. An oracle foretold that a son of Danaë would cause the death of Acrisius, and he accordingly imprisoned her in a tower of brass, but Zeus rescued her and made her his bride. Four years later Acrisius discovered the marriage union and learned that a babe had been born, when he promptly ordered that the mother and child should be secured and thrown into the sea. Under the direction of Zeus, the chest floated safely to one of the Cyclades, the island of Seriphus, where Perseus was protected by the king of the island under promise that he would slay the Gorgon Medusa and bring her head to him. In this he was aided by Hermes and Athena, who protected him from danger, while the Nymphs lent assistance in his Herculean task.

After reaching the dwelling of Medusa, near

Tartessus, he cut off her head with the sickle furnished by Hermes, and on his return liberated Andromeda from a sea monster.

PERSHING (pěr'shĭng), **John Joseph**, soldier, born in Missouri in 1860. He studied at Kirksville, Mo., and at the military academy in West Point, graduating from the latter in 1886. In 1891, after conducting a campaign against the Apache Indians, he became military instructor at the University of Nebraska. Subsequently he commanded in the Philippines and in Mexico, was made major-general in 1916, and the following year was sent to France at the head of the first expeditionary force of 28,000 soldiers. He received the full rank of general in 1917 and distinguished himself as commander of the American forces in France.

PERSIA (pěr'shà), a kingdom in the western part of Asia, called *Iran* by the natives. The name Persia is applied locally only to a small province, but in European geographies it extends to the entire country. It is bounded on the north by Russian territory and the Caspian Sea, east by Afghanistan and Baluchistan, south by the Arabian Sea, and west by the Persian Gulf and Asiatic Turkey. It extends about 900 miles from east to west and 700 miles from north to south. The area is about 635,000 square miles.

DESCRIPTION. The surface consists principally of an elevated plateau, much of which is desert, and along the western and northern boundaries are vast areas broken up by chains of rocky and precipitous mountains. The eastern part is quite level, but elevated, and along the Arabian Sea and Caspian Sea are tracts of fertile coast plains. The general elevation of the interior ranges from 2,000 to 6,250 feet above sea level, while the Elburz Mountains, trending along the Caspian Sea, rise to nearly 20,000 feet, Mount Demavend being the culminating peak. This mountain is a nearly extinct volcano, altitude 18,500 feet, and from its summit an outlook may be had over a vast stretch of country. West of the Caspian Sea are the mountains of Ararat and along the Persian Gulf are several ranges that approximate an elevation of 16,500 feet, including the range known as Kuh-Dinar. In the interior are two deserts, known as the Great Salt Desert, or Dasht-i-Kavir, in the north central part, and the Great Sand Desert, or Dasht-i-Lut, in the southeastern section.

The rivers of the interior are few and unimportant, and fully two-thirds of the surface is not drained into the sea, but the drainage is lost in the sands or swamp lands. Lake Urumiah, in the northwest, is the most important body of water, but there are many small inland saline lakes, fully thirty of them covering a considerable area and having no visible outlet to the sea. The Euphrates forms a small portion of the western boundary and is the only river of importance in navigation, though the Karun has been improved by jetties and canals for small

boats. A number of small streams flow into the Caspian Sea, including the Atrek and the Sefid Rud.

The climate of Persia varies according to location and elevation. In the central part the summers are extremely hot and the winters are cold. The region lying adjacent to the Persian Gulf has remarkably hot and oppressive summers and the winters are quite moist. As a whole the rainfall is limited, some regions being particularly arid, but along the Caspian and Arabian seas and the Persian Gulf there is an abundance of moisture and a dense growth of forests. Few sections of the country have to exceed ten inches of precipitation per year. Among the more important trees are the elm, oak, walnut, beech, cypress, cedar, box elder, and cottonwood.

MINING. Though rich in mineral wealth, mining has not been developed extensively as an industry. Turquoises of considerable value are obtained in Nishapur and other parts of Khorasan, the northeastern province. Salt is obtained in large quantities in the region lying inland from the Persian Gulf, which contains deposits of nickel, iron ore, gypsum, and sulphur. The coal fields are chiefly in the northern section and the province of Kerman, in the southeastern part, is rich in lead, copper, and marble. Other minerals include antimony, cobalt, nitrates, petroleum, and asbestos.

INDUSTRIES. Agriculture ranks as one of the leading industries. It is carried on partly in regions supplied with sufficient moisture by nature and partly in irrigated districts, but the methods of farming are crude and primitive. Wheat, barley, and rice are the principal cereals. Cotton of a superior quality is grown. Considerable interests are vested in the production of silk in the plains bordering on the Caspian Sea. Tobacco of a superior quality is grown for export. The poppy was introduced in 1864 and is cultivated as a source of opium in the southern provinces. Fruits of all kind thrive, but the larger share of attention is given to dates, grapes, oranges, peaches, and apples. Vegetables of all kinds are abundant and the melons of Persia take high rank in flavor. Other crops include sugar cane, madder, and indigo.

Stock raising is an important source of wealth. Large herds of domestic animals are pastured in the arid regions of the interior, vast tracts of which are peculiarly fitted for grazing. The horse of Persia is held in high esteem both for cavalry and ordinary draft purposes. Sheep and goats are grown on a large scale, the former for wool and the latter for meat and milk. Other animals include cattle, camels, mules, and swine. Fishing is carried on extensively off the shores of the Caspian Sea and the Persian Gulf.

Manufacturing is confined chiefly to artistic fabrics and textiles made of cotton, silk, and

wool. Persian carpets are celebrated in the markets of the world and not less than thirty standard varieties are exported. Woolen shawls are made of the hair of goats, the work being done almost entirely by hand. Velvets, embroidery, and silks of fine grade are produced. Considerable quantities of caviare are prepared from the sturgeon, sterlet, and other fishes. Earthenware, rugs, utensils, jewelry, glass, and carvings are made to a considerable extent.

TRANSPORTATION AND COMMERCE. Railroad building has been opposed on the ground that it is detrimental to the country, but a line is now in operation from Teheran to the Caspian Sea and other lines have been projected. While numerous national highways are maintained, only a few are improved by substantial bridges and extensive grading. A large majority of the inland trade is carried by caravans, for which purpose the camel is used extensively. About 8,500 miles of telegraphs and many lines of telephones are in use.

Tabriz, about eighty miles from the Russian frontier, is the leading commercial center. Teheran has a large inland trade. Bendu Abbas and Bushire, on the Persian Gulf, and Meshhed-i-Ser, on the Caspian Sea are the principal ports. The imports somewhat exceed the exports. Foreign commerce is chiefly with Russia, Turkey, Great Britain, Germany, and the United States. Cotton and woolen fabrics, sugar, breadstuffs, metal wares, and machinery are the principal imports. The exports include raw cotton and wool, rice, fish, fruits, cocoons, gums, opium, tobacco, live stock, and precious stones.

EDUCATION. The educational interests of Persia are in a very primitive state. Instruction is carried on by means of primary schools, tutors, and a number of higher schools. Government support is extended to the higher schools and to several colleges, mostly in the form of grants, and the courses outline instruction in religion, Persian and Arabic literature, sciences, and some of the industries. The Koran is the principal book of instruction and the greater part of the people who receive any instruction at all learn to read that book. All the wealthy parents employ private tutors.

GOVERNMENT. The government is a constitutional monarchy and the Shah is the chief executive. He is assisted by a ministry of eight members, who officiate under the direction of a grand vizier. Mohammedanism of the Shiite sect is the prevailing religion and is directed by the Imam-Juma. Legislative authority is vested in a senate of 60 and a national council of 156 members. The former are appointed by the crown and the provinces and the latter are elected by popular suffrage. For the purpose of local government the country is divided into five provinces, or *mamlikats*, and thirty smaller provinces called *vilayets*. The Shah holds his office by heredity and has the power to appoint

the governors of the provinces. The priests have a large influence in governmental affairs and justice is generally summarily administered. It has a standing army of 25,000 men, but a reserve brings the mobile military force up to 105,500. The navy consists of five small steamships. Revenue is raised principally from the mines, fisheries, customs, and various concessions. The *kran* is the monetary unit and is valued at eight cents in the money of Canada and the United States. The largest estate of Persia belongs to the Shah, is estimated at a value of \$22,500,000, and consists largely of precious stones.

INHABITANTS. A large proportion of the rural population consists of nomadic tribes of Kurds, Turks, Arabs, and Lurs. However, the inhabitants consist chiefly of Iranians, or pure Persians, and the Turkish and Tartaric tribes known as Turanians. The people may be divided into dwellers in villages and towns and dwellers in tents. During the hot summer months many of the richer families take up their residence in the mountains, where they have summer homes. The religion is almost exclusively Mohammedan. Those not Moslem in faith include principally Jews, Armenians, and Nestorians. The percentage of Europeans in the country is small, a total of not more than 950. In 1918 Persia had a population of 9,125,000. Teheran, in the north central part, is the capital. Other cities include Tabriz, Ispahan, Meshed, Kerman, Balfrush, Yezd, Resht, Shiraz, and Kashan.

LANGUAGE AND LITERATURE. Many different but closely related dialects are spoken in Persia. The Iranian language is used most extensively. It includes a number of dialects and is grouped with the Aryan or Indo-European division of languages. The Zend-Avesta is the oldest writing. It is the sacred book of the Parsees (q. v.) and dates from the time of Zoroaster, though at present only a portion of the original is extant. Other writings include the Gathas, dating probably from the period between 1200 and 1000 B. C., which constitutes a part of the sacred Zoroasterian literature in a language closely allied to the Sanskrit of the Vedas. The language afterward became greatly modified, as is shown by the cuneiform inscriptions on monuments dating from the time of Cyrus. With the Mohammedan conquest other changes in language and literature occurred, but in the 9th century A. D. Persia again ascended to importance, and continued the predominating influence until the Mongols overran the country and destroyed much of its treasures in wealth and literature.

Modern Persia dates practically from the ascent of Ismail Sufi, and since that time the modern Iranian language has been gradually developing. The Arabic characters are used in writing, but four letters have been added. Persian literature is rich in poetry, biography,

and history. Rudagi, who flourished about the middle of the 10th century, is the father of Persian poetry, and Tabari of about the same period is the first great historian. Ausari, author of "Mamik and Asra," and Firdusi, author of the national epic, "Shah-Nameh," flourished in the 11th century. Omar Khayyám (died 1123) wrote the celebrated lives of saints, entitled "Pend-Nameh." Sadi, the great didactic poet, flourished in the 13th century, and Hafiz, the most captivating of Persian poets, wrote in the 14th century. Fericht Ferishtah, who lived in the early part of the 17th century, wrote historic works of great value.

Many of the legends of Persia have been translated into numerous European languages. The Persian drama is the most noted extant in Asiatic countries. Much of the knowledge of astronomy was secured from the Arabs, but the original works in religion are both numerous and superior. The dictionaries and texts on grammar are abundant, and the country has some excellent and authoritative works on geography and geology. Persia had few great writers after the 18th century. Ferid Ghafer Khan, who enriched literature by collections of Oriental fairy tales, is among the latest of note. Within recent years many translations have been made from European languages.

HISTORY. The history of Persia begins several thousand years before the Christian era, but the earliest data are wrapped in doubt and tradition. Originally, the country was limited to a small tract along the northern shore of the Persian Gulf. Later it became part of the Assyrian Empire, but in 708 B. C. an empire was established under Dejoces. The sovereigns eventually united in the kindred tribes and subdued all of Assyria. Cyrus, about 558 B. C., rebelled against the Medes and by his successes made the Persians a powerful nation. The boundaries were extended to include Syria, Palestine, Mesopotamia, and Asia Minor, and he became known as the founder of the Persian Empire. His son, Cambyses, succeeded to the throne in 529 B. C., and during his reign of seven years conquered Egypt, Tyre, and Cyprus. Darius I. annexed Macedonia, Thrace, and a part of India. Xerxes I. became the ruling sovereign in 485 B. C. and was succeeded by Artaxerxes I. in 465 B. C., the latter ruling until 425 B. C. Soon after internal strife began to divide the empire, and in 330 B. C. Alexander the Great, King of Greece, conquered all of the former provinces of Persia and made them a part of Greece.

With the death of Alexander, in 323 B. C., Persia was divided into several provinces, but the greater part was governed by Seleucus, the general of Alexander, and later by his successors, the Seleucidae. Subsequently a long line of dynasties governed the country, during which time it was visited by successive wars that destroyed its former glory and tended to greatly

lessen the population. The Arabians under Caliph Omar conquered Persia in 636 A. D., after which the religion of ancient Persia became supplanted by Mohammedanism. In 1387 Tamerlane conquered Persia with a horde of Mongols and extended his reign from Hindustan to Asia Minor. At his death, in 1405, the country came under the dominion of the Turkomans, who reigned until 1501, when they were succeeded by Ismail Sufi. The latter pretended to be a descendant from Ali, son-in-law of Mohammed, and assumed the title of Shah.

Teheran was made the capital of Persia in 1796, when Futteh Ali removed his residence to that city. This sovereign carried on a disastrous war against Russia and in 1828 was



CHALCEDONY CYLINDER: SIGNET OF DARIUS I.

obliged to cede all of Persian Armenia to the Czar. He was succeeded by Mehemet Shah in 1834, whose reign was uneventful, and he died in 1848, when Nasr-ed-Din became the ruling sovereign. In the meantime a dispute arose with the British regarding the sultanate of Herat, which was ceded to the latter in 1857, but subsequently some territory formerly belonging to Oman was annexed. The Shah was assassinated at Teheran, in 1896, and Muzaffar-ed-Din was proclaimed the sovereign. He not only reduced the taxes and instituted important reforms, but in 1906 subscribed to a constitution, the first in the history of the country. By this act the nation passed from an absolute to a representative government. However, the sovereign died early in 1907 and was succeeded by his son, Mohammed Ali Mirza. He abdicated in 1909 and was succeeded by his son, Sultan Ahmad Shah.

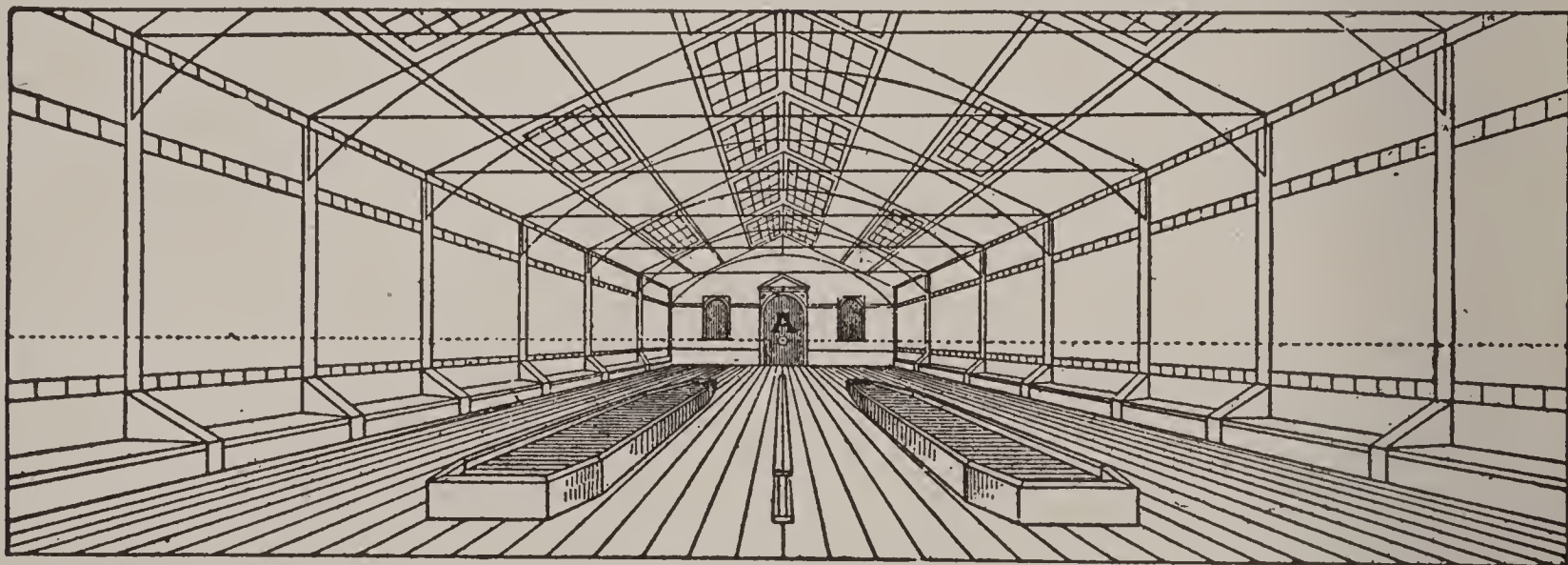
PERSIAN GULF, an inlet from the Indian Ocean, situated between Persia and Arabia, and connected with the Arabian Sea by the Strait of Ormuz. It is 575 miles from north to south, and about 185 miles wide. Within the gulf are a number of islands, including Ormuz and the Bahrein Isles. The shores are generally rocky, except in the northern part, where the Euphrates and Tigris enter by a vast delta. Both the fin and pearl fisheries are abundant. The gulf is valuable for navigation. Bushire is the principal seaport. The tide rises twelve feet at the Strait of Ormuz. In ancient times

the Persian Gulf was known as the Sea of Babylon.

PERSIGNY (pâr-sê-nyê'), **Jean Gilbert Victor Fialin**, noted statesman, born at Saint-Germain-l'Espinasse, France, Jan. 11, 1808; died at Nice, Jan. 12, 1872. In 1826 he was admitted to the school of cavalry at Saumur, and two years later entered the military service as a husar. His family name was Fialin, but he took the name Persigny in 1833, when he became a supporter of Napoleon. To further the interests of the latter, he published a journal devoted to the royalist cause, and actively carried on a personal campaign with energy throughout France and Germany. In 1836 he instigated a military rising at Strassburg and was arrested, but effected his escape. He joined Napoleon in his expedition to Boulogne, where he was again arrested, but secured his liberty after a brief period of confinement. His part in the Revolution of 1848 contributed largely to strengthen Napoleon, and by his influence the latter was placed in the presidency on Dec. 10, 1849, while he aided to hasten the events by which Bonaparte became Napoleon III., in 1851. In 1852 he was made minister of the interior, in 1855 became ambassador at the English court, and in 1859 was recalled to resume the office of

PERSONAL PROPERTY, the name applied to every kind of property which is not real estate, such as furniture, jewelry, live stock, money, and stocks and bonds. Title to personal property may be acquired by an agreement between the parties, but the contract need not to be completed before an officer of the law, as is the case in transferring real estate by deed or otherwise. In some states personal property cannot be held as acquired by purchase, unless the possession passes from the seller to the purchaser. Where the possession does not change by reason of a sale, it is necessary in most cases to have a bill of sale properly acknowledged and recorded.

PERSIUS (pêr'shî-ûs), **Flaccus Aulus**, famous Roman poet and satirist, born in Etruria in 34 A. D.; died Nov. 24, 62. He descended from a celebrated equestrian family, was educated at Rome under the Stoic philosopher, Cornutus, and there became associated with the most eminent men of his time. Persius is noted as the author of six satires, which have been renowned from his own time down to the present. Their value lies largely in the sternness with which the corruption of morals prevalent at Rome is censured, and in their excellent literary style and language. These satires have



INTERIOR OF A HALL, SHOWING IMPORTANT POINTS AND LINES.

minister of the interior. Napoleon created him a duke in 1863, and subsequently he served in the senate until 1870, when the empire was overthrown.

PERSIMMON (pêr-sîm'mûn), a tree of the ebony family, sometimes called the *date plum*. It is native to Asia and was introduced to the southern part of the United States in 1875. The *American persimmon* is native to the region extending from Indiana to the Gulf of Mexico. It attains a height of from 25 to 60 feet and yields a plumlike fruit about an inch in diameter. The fruit is much smaller than that of the species found in Asia. It has from six to eight seeds and is astringent and bitter to the taste until it is made sweet and mellow by the frost. The fruit is edible. Tonics and astringents are prepared from the bark of the tree.

been printed largely with those of Juvenal and they have been favorably commented on by Jerome, Augustine, and other fathers of the church. Some of his writings are borrowed from other authors, but all are touched with a vein of originality, and the dialogues employed are the most dramatic found in Latin writings. Many translations have been made, including 25 into German, 20 into French, and 14 into English.

PERSPECTIVE (pêr-spêk'tîv), the art of representing on a plain surface objects as they appear to the eye from any determinate point of view. All the points of the surface of a body are visible by means of luminous rays which proceed from these points to the eye. As we look out of a window, the glass may be considered the intersecting plane, and, if

we draw or paint upon the glass the objects visible through it, we produce in the painting a true perspective. However, only one eye must be used, as each eye, having its own view, sees the objects in a different place on the plane of the glass. Since no painting can be entirely satisfactory without correctness of perspective, it will be seen that perspective is intimately connected with painting and other arts.

The term *linear perspective* has reference to the effects produced upon the observer by the distance and position of the apparent form and grouping of objects. On the other hand, *aërial perspective* is confined to the distinctness of objects, as modified by light and distance. In the contemplation of a landscape, we observe that the objects nearest to us are most distinct in outline and color, but as they recede from the view the forms become vague and shadowy and the colors lose their intensity and blend together. In painting a picture, therefore, to harmonize with nature, it must not only be drawn true to perspective, but it must also be colored in reference to the proximity of the objects to the spectator. This is termed the art of *aërial perspective*. A projection called *isometrical perspective* has been devised to aid in giving a perspective effect to the drawing of an object and yet enable it to be measured by a scale. Isometry is applied both to mechanical and architectural drawing.

PERTH (pĕrth), a city of Australia, capital of the State of Western Australia, near the Indian Ocean. It is located on the Swan River, about ten miles northeast of Freemantle, its port, and has communication by the Eastern Railway. The surrounding country is mining and agricultural. Among the principal buildings are the Governor's palace, the city hall, the Parliament house, an observatory, and several schools and churches. The streets are regularly platted and improved with pavements. It has waterworks, gas and electric lighting, and electric street railways. Clothing, tobacco products, machinery, earthenware, and canned fruits are among the manufactures. The place was platted and incorporated as a city in 1856. Population, 1907, 50,527; in 1921, 154,866.

PERTH a city in Scotland, capital of a county of the same name, on the Tay River, 42 miles northwest of Edinburgh. The Tay is crossed by a fine bridge of nine arches, 880 feet long. Perth has a beautiful site on the banks of the river, where the scenery is beautified by the Grampians and by excellent forests and parks. It has extensive railroad connections, a city water system, street railways, pavements, and other municipal facilities. Among the manufactures are spirituous liquors, machinery, textiles, dyes, and utensils. The salmon fisheries of the Tay are valuable and much of the product is canned here. The city has a number of fine buildings, including the Church of Saint John, the King James VI. Hospital, a penitentiary, the

public library, the central railway station, and a number of educational institutions. It is thought that Perth was founded by the Romans. It was the capital of Scotland until 1437. Population, 1921, 35,851.

PERTH AMBOY (ăm-boi'), a city and port of entry of New Jersey, in Middlesex County, on the Raritan River and Bay, 21 miles southwest of New York City. It is on the Pennsylvania, the Lehigh Valley, the Central of New Jersey, and other railroads. Communication is maintained by steamboats and electric railways. In the vicinity are valuable deposits of kaolin and fire clay. The chief buildings include the public library, the high school, the townhall, the Y. M. C. A., and many churches. Among the manufactures are terra cotta, cork, emeryware, chemicals, tobacco products, oil, and drain tile. The city has a large trade in cereals and merchandise. It was settled by Scotch people in 1683 and was incorporated as a city in 1784. Population, 1905, 25,895; in 1920, 41,707.

PERTURBATION (pĕr-tŭr-bă'shŭn), in astronomy, a disturbance in the movement of the planets or other celestial bodies, causing them to deviate from their elliptic orbit. These movements are due to the attraction of other planets upon a heavenly body. According to Kepler's laws, if a planet were attracted by no body except the sun, it would describe an ellipse, with the sun in one of the foci, but other planets in the solar system cause it to deviate from such an ellipse. Perturbations are either *periodic* or *secular*, the former of which compensate each other, while the latter are changes in the form of the orbit which go on in the same direction from time to time.

PERU (pĕ-rōō'), a city of Illinois, in La Salle County, on the Illinois River, 98 miles southwest of Chicago. It is near the Illinois and Michigan Canal and on the Chicago, Rock Island and Pacific and the Chicago, Burlington and Quincy railroads. The surrounding country is agricultural, producing cereals and dairy products, and contains extensive deposits of bituminous coal. It has several fine churches, a public park, and public waterworks. The chief buildings include the Turner Hall, the Masonic Temple, and the public high school. Among the manufactures are flour, hardware, cigars, machinery, beer, clocks, and farming implements. It has a growing trade in merchandise. Peru was settled in 1827, platted in 1834, and chartered as a city in 1852. Population, 1900, 6,863; in 1920, 8,869.

PERU, a city in Indiana, county seat of Miami County, on the Wabash River, 75 miles north of Indianapolis. It is on the Wabash, the Lake Erie and Western, and other railroads. The river is crossed by several fine bridges. It is surrounded by a rich farming and dairying country. Among the manufactures are textiles, artificial ice, carriages, flint glass, ironware, flour, machinery, and bags. The

noteworthy buildings include the county courthouse, the public library, the sanatorium, and the Wabash Railroad Hospital. It has good municipal facilities, such as waterworks, a fire department, electric lighting, and street railways. Natural gas and coal are found in its vicinity. The place was incorporated in 1848. Population, 1900, 8,463; in 1920, 12,561.

PERU, a country of South America, one of the five republics that border on the Pacific Ocean. It is bounded on the north by Ecuador, east by Brazil and Bolivia, south by Chile and the Pacific, and west by the Pacific. The length from north to south, measured along the coast, is 1,100 miles and the greatest breadth is 800 miles. It has a total area of 698,350 square miles.

DESCRIPTION. The surface varies greatly in its composition and elevation above sea level. A narrow coast plain lies along the Pacific and about 60 miles inland the Andes Mountains trend almost parallel to it. This coast region is largely a sandy desert, ranging in width from 20 to 120 miles, and rises gradually to form the foothills of the Andes. The Andes are about 250 miles wide and are characterized by many lofty summits, among which stretch elevated plains and tablelands. These highlands are in two chains, or cordilleras, many of which are volcanic and contain thermal springs. Fully two-fifths of the surface of Peru is occupied by the highlands and mountains. They reach summits of from 14,000 to about 20,000 feet, including Cotopaxi and Chimborazo, with elevations of 19,613 and 20,498, respectively. In the eastern part stretches a vast region included in the Amazon basin, through which many streams flow eastward. The Amazon basin in Peru is known as *Montaña*, or Los Bosques, and abounds in dense forests and other forms of luxurious vegetation.

The drainage belongs to two systems, that of the Pacific slope and that of the Amazon. All of the streams on the Pacific slope are short and unimportant and many are lost in the desert sands. A few streams, such as the Santa River, carry a small quantity of water during the dry season, but at the time of heavy rains become great torrents. The rivers east of the Andes include the Amazon, the upper course of which is called the Marañón, the Ucayale, the Javari, and the Juruá. Of these the Amazon is the most important, being navigable from Iquitos, in eastern Peru, to the Atlantic. Several beautiful lakes are in the mountain regions, including Junín and Titicaca, which are more or less valuable for their fisheries. The latter has an elevation of 12,500 feet above sea level. It is the most important inland lake of South America and belongs partly to Bolivia.

The rainfall is greatly diversified, owing to the varying effects of the altitude and the trade winds. On the coast region rain seldom falls, for the reason that the trade winds, passing across the continent from the Atlantic, exhaust

their supply of moisture in sweeping over the Cordilleras, hence that region is dry and arid, and the rivers, fed partly by springs and mountain snow, are practically the only source from which water can be drawn for irrigating cotton and sugar plantations. At Lima, on the coast, not more than one or two inches of rain fall during the year. In the mountains and the Amazon basin rainfall is abundant. The climate of the coast is hot, but is somewhat modified by the winds blowing from the snow-capped Andes and by cold oceanic currents. January and February are the hottest months, when the mean temperature on the coast is 84°, but the maximum of 98° and even 105° is reached. In all parts of Peru the climate is exceptionally healthful.

MINING. The country is rich in minerals, but comparatively little effort is put forth to develop the resources. In the mining industry it is surpassed by both Chile and Bolivia. Silver is mined extensively at Cerro de Pasco, Puno, and Recuay. These fields were opened as early as 1660 and produced \$475,000,000 in silver up to 1849, but at present the annual output is only about 1,225,000 ounces. Gold is obtained in many sections of the country, but is mined most extensively in the eastern ranges of the Andes. Coal of a good quality is mined in the provinces of Huamachuco and Hualgayoc. Other minerals include petroleum, copper, salt, lead, borax, sulphur, quicksilver, mercury, and zinc. Mining has been retarded to a great extent for the want of transportation facilities.

AGRICULTURE. Farming is developed most extensively in the fertile coast valleys, where coffee, sugar cane, and cotton are grown. The irrigated area includes a total of 450,000 acres and a large part of this is utilized to cultivate sugar cane. Rice and tobacco yield good returns and maize and alfalfa are grown profitably. Potatoes and vegetables thrive. Fruit culture receives marked attention, especially olives, grapes, and bananas. Other products embrace cinchona, coffee, rubber, cocoa, and guano. Various medical plants and dyewoods obtained in Peru possess great value.

The live-stock industry, though not represented as extensively as the resources permit, has been developed chiefly in the eastern part, where large areas have nutritious grasses. Sheep are grown extensively for wool, but this product is obtained also from the alpaca and the llama. Poultry raising has received much attention and the grades are superior, but cattle and horses are not well bred. Goats, swine, and mules are grown to some extent. An extensive and remarkable fauna of wild animal life is still represented, including the tapir, vicuña, sloth, armadillo, alligator, guanaco, monkey, and boa constrictor. Many beautiful birds of song and plumage abound. The larger species of birds include the toucan, hawk, buzzard, pheasant, and condor.

MANUFACTURES. Comparatively little has been done to develop manufacturing, but foreign capital is promoting many lines that furnish commodities for exportation. Sugar is one of the leading products and is made almost exclusively from home-grown sugar cane. Several large establishments prepare rice for market, and considerable interests are vested in the manufacture of wine from native-grown grapes. Smelting is an important enterprise in connection with the mines. Pipe tobacco, cigars, malt and distilled liquors, furniture, clothing, and textiles are made chiefly for home consumption. Fine straw hats are made in large quantities and these are sold in the trade as *Panama* hats. While a large quantity of petroleum is produced, only a small per cent. of it is refined. Other manufactures include boots and shoes, soap, olive oil, cotton-seed oil, and canned fruits.

TRANSPORTATION AND COMMERCE. The Amazon is the only navigable river and steamers ascend regularly as far as Iquitos. Callao, the port of Lima, has a large coastwise trade and steamboat connections with the principal ports of Europe and America. Railway building is encouraged by the government and the lines in operation have a length of 2,100 miles, but a large part of the systems is narrow gauge. The principal lines connect the coast with interior points, but few branches are maintained. The longest line extends from Mollendo, on the Pacific, to Puno, on Lake Titicaca, with a branch running north to the valley of the Apurimac River, and several lines have been projected to connect with the railways of Bolivia and Brazil, which form a part of the transcontinental systems. Most of the highways are in poor condition and consist principally of paths used in transferring goods by mules and llamas. The telegraph lines include about 8,500 miles and the telephone, about 5,200 miles. Railway and highway construction is extremely difficult in the mountainous regions, owing to their vast elevation and the rocky and craggy character, thus requiring great engineering skill in promoting these enterprises.

The exports slightly exceed the imports, but both have shown a slight increase from year to year. Sugar and ores are the leading exports and these are followed in order by wool, cotton, coffee, borax, hides, rice, and cocaine. Manufactures of various kinds, especially cotton and woolen goods and small wares, are the leading imports. Other commodities imported include furniture, wines, drugs, and machinery. Foreign trade is chiefly with Great Britain, Germany, the United States, France, and Chile.

GOVERNMENT. The present constitution was revised in 1860. It vests the executive power in a president, who is elected by popular suffrage for four years. He is assisted by a cabinet of six ministers, who hold office at his pleasure, but his acts are subject to their approval. The legislative authority is vested in

a senate and house of representatives, the former having 48 and the latter 108 members. A supreme court of justice has final jurisdiction and is composed of judges appointed by the president subject to confirmation by congress. Peru is divided into seventeen departments and two provinces. Each department has superior courts. Local government is administered in departments and districts, the chief officers of which are appointed either by the president or by prefects in the various departments.

EDUCATION AND RELIGION. Education has not advanced materially, though there is a compulsory attendance law. A system of high schools is maintained under national laws and the high schools are generally under departmental supervision. San Marcos is the seat of the national university, which has an attendance of 675 students and maintains faculties of medicine, law, literature, theology, and political science. Other universities are maintained at Cuzco and Arequipa, and several botanical and zoölogical gardens are supported at Lima. Equal political and religious freedom are guaranteed under the constitution, but Roman Catholicism is the state religion. While other sects have not been excluded, it is required by law that the state religion be respected.

INHABITANTS. The native population, consisting chiefly of Peruvian Indians, comprises more than half of the inhabitants. About one-fourth are of mixed blood and the remainder are chiefly Spaniards or of Spanish descent. Although Spanish is the national language, the Peruvian dialect is still spoken by a majority of the people. The population is quite stationary, showing only a slight increase from time to time, and immigration from Europe is very small. In 1916 the population was estimated at 4,850,000. Lima, the capital, is the largest city. Other cities include Cuzco, Arequipa, Callao, Concepcion, Catacaos, Iquitos, and Truxillo.

HISTORY. Little is known of the ancient history and civilization of Peru. Writers generally divide its history into three periods: the Pre-Incarial, the Incas, and the Spanish periods. The *Pre-Incarial* period includes a time of unknown duration, when the region was populated by a people who were highly advanced in language and civilization and built vast cities. Traces of this period are abundant near Lake Titicaca and elsewhere, and occur in the form of sculptures, pillars, immense masses of hewn stone, ornaments, and fragments of buildings. Nothing is known of the origin of the Incas, but they are thought to have been less advanced in civilized arts than the people who preceded them and, when the Spanish invaders conquered the region, their cities and industrial arts had reached much development. The region now included in Peru, according to some writers, then had a population of fully 30,000,000 people. Pizarro with a band of Spanish adventurers invaded Peru in 1532 and before the end of

the year captured Athualpa, the Incas sovereign, and destroyed his power.

From the conquest by Pizarro until 1821 Peru was a Spanish possession, but in the latter year independence was proclaimed. However, Spanish dominion did not terminate until 1824, when a prolonged war ended favorably to the revolutionists. A constitution was adopted soon after, which was supplanted by the constitution of 1856, and the latter was revised in 1860 and modeled after the Constitution of the United States. Peru and Bolivia formed an alliance against Chile in 1879, which resulted in the success of the latter, and accordingly Peru ceded by treaty, in 1883, the province of Tarapaca to Chile. This cession was a heavy loss, because the province contains vast deposits of nitrates and other valuable minerals. Since then several unimportant insurrections have occurred, but in the main the government has been stable and the country has been reasonably prosperous. Peru severed diplomatic relations with Germany in 1917, but did not declare war. In 1918 serious clashes occurred with Chile because of conflicting interests in Tarapaca, but active warfare was averted by negotiations.

PERUGIA (pǎ-rōō'jǎ), a city of Italy, on the Tiber River, ten miles east of Lake Perugia and 83 miles north of Rome. It is the capital of the province of Perugia, which is highly fertile. The city is surrounded by fortifications and contains a number of massive buildings, including a Gothic cathedral built in the 15th century. The University of Perugia was founded in 1320. This institution has a fine museum, carries advanced courses of study, and has a library of 30,000 volumes. Other noteworthy buildings include the orphan asylum, the public library, the central railroad station, and the Roman Arch of Augustus. Among the manufactures are silk and woolen goods, velvets, liquors, soap, utensils, and machinery. The railroad connections with Rome, Florence, and other cities make it an important market for produce and merchandise. Perugia was anciently an Etrurian republic, but in 294 B. C. it became a part of Rome. In 1860 it was annexed to Italy by Victor Emmanuel, since which time it has benefited greatly by railway building and other improvements. Population, 1916, 63,835.

PERUGINO (pǎ-rōō-jě'nō), **Pietro Vanucci**, noted Italian painter, born in Umbria, about 1446; died near Perugia in December, 1523. He first studied at Perugia, from which city he received his name, and later he was instructed in Florence under Andrae Verocchio. About 1480 he established himself at Rome, where he was employed by Pope Sixtus IV. to decorate with frescoes the Sistine Chapel. His fresco entitled "Christ Giving the Keys to Peter" is one of the finest in that building. Other productions that have made his name famous are still preserved in Bologna, Perugia, Rome, and Florence, and in a number of Euro-

pean galleries are specimens of his paintings. Raphael was for a time a student with Perugino.

PERUVIAN BARK (pě-ru'vī-ān), a valuable product of several species of trees belonging to the genus *Cinchona*. The trees that yield this product are native to Peru and other countries of South America. Peruvian bark is known in some countries as *cinchona bark*, *china bark*, and *Jesuits' bark*, the last mentioned name being from the Jesuits, who introduced it into Europe. This product is valuable as the source of *quinine*, which is extracted and sold extensively for medical purposes. It also yields *cinchonine*, an alkaloid occurring with quinine in the bark, but it is less powerful than quinine, though its physiological effects are the same.

PESHAWAR (pǎ-shā'wūr), or **Peshaur**, a city of India, capital of a province on the northwestern frontier, twelve miles east of the Khyder Pass. It is located on the Kabul River and has narrow and crooked streets. The architecture is largely of mud and wood. The chief buildings include a mission school, the government house, several large bazaars, and a number of Christian churches. It is important as a British military station and has railway connections with the leading cities of India. The trade is chiefly in carpets, live stock, and cereals. It has manufactures of cotton and woolen textiles, pottery, and machinery. A large majority of the inhabitants are Mohammedans. Population, 1916, 96,741.

PESO (pǎ'sō), a Spanish coin equal to from fifty cents to one dollar in the money of Canada and the United States, used as the monetary unit in several countries of South America. It is divided into 100 *centimos*, but in some countries the subdivisions are known as *centimes*, or *centavos*, and smaller coins known by these names are issued for circulation.

PESSIMISM (pěs'sī-mīz'm), the name applied to a doctrine announced by Schopenhauer in 1819, which implies the theory that the world is bad rather than good. It stands directly opposite to *optimism*, in that the optimist sees the good and beautiful in everything, while the pessimist maintains an unfavorable view of everything in nature and doubts whether life is worth living. The view that vast evils exist to overshadow the good has been associated with nearly all philosophic and religious systems at some stage in their development. Anciently the Greeks had doubts as to the reality of knowledge and good, while the Brahmans and Buddhists regard life illusory and burdensome. Rousseau agreed with the doctrine expressed by some of the Greek philosophers that the world is degenerating. Schopenhauer thought that the world is the worst possible under existing conditions, and that life should be a denial and suppression of will. Eduard von Hartmann (q. v.) expressed the view that the world is wholly bad, but he regarded it the best under metaphysical limitations. He thought that will is a

craving to exist, involving much suffering, and that ultimately it will cease existence altogether.

The tendency to look on the dark side, though holding that there are both good and evil in the world, may be assigned to the fact that many individuals spend much time in contemplating unhappiness and actual pain. They place stress upon the realization that the ideals of the human soul are superior to the conditions actually experienced in the mortal state. That life is worth living is proven by our desire to live, and that pleasure exceeds pain is evidenced by our experience, but its realization is often interfered with by brooding over trifling or apparent losses. Pessimism as a doctrine is good so far as it teaches that the highest reward of virtue is self-respect and points out barriers to happiness in this life, particularly if it seeks to remove these barriers by wise methods.

PESTALOZZI (pēs-tā-lōt'sē), **Johann Heinrich**, German educator and educational reformer, born in Zurich, Switzerland, Jan. 12, 1746; died in Brugg, Feb. 17, 1827. His



JOHANN H. PESTALOZZI.

mother was left a widow with three children in 1751, and under her direction he received a rather sentimental and impractical education. It was his custom to be touched by feeling and emotion, rather than by reasoning and reflection, and he accordingly became an object of sport among his companions. In 1760 he entered the academy and there distinguished himself by political enthusiasm, and was led to see the needs of the people educationally and socially. He developed a taste for a simple and frugal life and was especially fond of pastimes in the open air. This caused him to take much delight in spending his vacations in the country at his grandfather's, who was a minister at Hoengg. At first he designed to enter the ministry and later to study law, but he was unsuccessful in both and decided to become an agriculturist, which he did at Neuhaus by purchasing some waste land. It was his design rather to improve the material conditions of the peasants by developing a new industry than to enrich himself. In 1769 he married Anna Schultess, the daughter of a wealthy merchant, but in 1775 his financial resources were exhausted. It now became his ambition to improve the educational status of poor children at Neuhaus. Accordingly he opened an asylum on his farm, which was at first successful, but failed in 1780.

After the failure of this educational enterprise, Pestalozzi devoted himself to writing, hoping thereby to secure an improvement for the people educationally. In 1780 appeared

"The Evening Hours of a Recluse." The first volume of "Leonard and Gertrude" was published in 1781, and soon after he completed his "Researches on the Course of Nature in the Development of the Human Race." He returned to farming in 1787 and engaged in that occupation for a period of ten years, and in the meantime became the founder of several agricultural institutes, organizations in which the peasants met for the purpose of discussing many topics in relation to their industry. In 1798 he established the orphan asylum at Stanz, in which he hoped to put into practice his principles of education, and when he was offered the position of director in a normal school he declined it to remain a teacher at the asylum. This enterprise was discontinued in 1799 by a war that then affected his country, but before the close of the same year he established himself as teacher of a primary school in Burgdorf.

The last of the four educational schools established by Pestalozzi was the institute at Yverdon in 1805. This institution was located at the foot of Lake Neuchâtel, in French Switzerland, and was for a number of years not only highly successful, but excited the admiration of many distinguished visitors. While there he published "A Book for Mothers" and completed "Gertrude." His institute at Yverdon began to decay and was finally discontinued in 1825. Pestalozzi returned to the farm at Neuhaus soon after and there wrote "The Swan's Song" and "My Destinies." He attracted the attention of all the leading educational thinkers and writers of Europe by his excellent methods and theories of education, and from him teachers still draw inspiration for their work more largely than from any other writer.

Among the many meritorious theories of Pestalozzi may be mentioned the view that to know the end is to find the way, and to be possessed with an impulse to reach an end is to make a way. He had impulses of the highest and noblest kind which animate the human soul, but lacked that studious insight which leads to the development of a correct method. While he was an unsurpassed educator, he was not a successful teacher, and the story of his devotion to the study of the nature of children and the desire to better their condition is one of the most pathetic in the history of education. He was buried at Birr, at which place the canton of Argovia erected a monument to him in 1846, with the following inscription: "Here lies Henry Pestalozzi, born at Zurich, Jan. 12, 1746; died at Brugg, Feb. 17, 1827. Savior of the poor at Neuhaus, preacher of the people in 'Leonard and Gertrude,' father of orphans at Stanz, founder of the people's school at Burgdorf and Munchen-Buchsee, educator of humanity at Yverdon, man, Christian, citizen: everything for others, nothing for himself. Blessed be his name."

PESTH. See **Budapest.**

PÉTAIN, Henri Phillipe, soldier, born in France in 1856. He studied military tactics and attained to the rank of colonel before the beginning of the Great European War, in 1914. In the first year of the war he distinguished himself at the Battle of the Marne and later as the defender of Verdun. In 1917 he was made commander-in-chief of the armies in France, succeeding General Joffre. His success may be attributed to his exceptional ability as a strategist.

PETARD (pê-tärd'), an instrument used formerly for making breaches in the walls of forts and for destroying gates and palisades. It was made of a conical iron, in which from five to twelve pounds of powder were placed, and, after attaching it to the object to be demolished, a slow match was applied to the touchhole.

PETALUMA, a city of Sonoma County, Cal., on Petaluma Creek and on the Northwestern Railroad. It is in a fruit district and has electric and gas plants, street railways, and growing manufacturing interests. The surrounding country produces fruit, cereals, lumber, and dairy products. It has a large export trade. Population, 1920, 6,226.

PETCHORA (pâ-chō'râ), a river in the northern part of Russia, which rises in the Ural Mountains and flows north into the Arctic Ocean. It passes the city of Koshva and receives the inflow from the Ussa and Koshva.

PETER, Saint, or Simon Peter, an apostle of Jesus, born in Bethsaida, a town on the Sea of Galilee. Both he and his brother Andrew were fishermen, and after Jesus called them to become disciples and fishers of men they appear to have lived together at Capernaum. Jesus added Cephas to his original name Simon, the former being from the Syriac *kepha*, meaning a rock, and the Greek work of the same meaning is *petra*, hence he became known as Peter.

While Paul was the special teacher of the gentiles, Peter applied himself with equal zeal to the conversion of the Hebrew race, and he is credited with having preached in Cappadocia, Pontus, Galatia, Bithynia, and Rome. His ministry was chiefly to those of his own nation who were dispersed in these countries, all the cities but Rome being named in the first of the two epistles which he wrote. The Christian churches hold his opinions of much importance. Most writers think that he visited Rome as early as 43 and that he finally settled there in 63 A. D., while his martyrdom is generally fixed in the year 66, at the same time and place at which Saint Paul suffered death. Eusebius states that Peter was sentenced to be crucified, and at his own request was nailed to the cross with his head downward, this being asked in order that his martyrdom might not be honored by being like that of his Lord.

PETER I., called Peter the Great, Alexeievitch, Emperor of Russia, born in Moscow, June 11, 1672; died Feb. 8, 1725. He was the son of Czar Alexei Mikailovitch, who died in

1676. The throne was left to Feodor, half-brother of Peter, who died in 1692 without issue. The latter named Peter as his successor for the reason that Ivan, his full brother, was weak-minded. His mother, Natalia Kirilovna, became the regent of Peter, but an insurrection was at once organized by the children of Alexei's first marriage. The insurrectionary forces were mainly under the direction of the Grand Duchess Sofia, sister of Ivan, and the latter was



PETER THE GREAT.

finally crowned emperor with Sofia as regent. Peter was placed under the instruction of Franz Timmerman, a native of Strassburg, who taught him mathematics and military art and developed his physical powers by gymnastic exercises. Later he studied the sciences and arts of civilization under a native of Geneva, Switzerland. Thus equipped in educational arts and military sciences, Peter called upon Sofia, in 1689, to resign the government. Refusing to surrender her right to the government, she was confined in a convent until her death in 1704.

Peter the Great allowed Ivan to govern nominally, while he was virtually the sole emperor, and in 1696 the former abdicated. Once in supreme command, he immediately began to plan the development of Muscovite power. He reorganized and disciplined the army, invited engineers and architects from abroad to aid in the construction of highways and public buildings, and personally visited the Netherlands to become acquainted with naval arts. The greater part of his time in 1697-98 was spent in the shipyards of Holland and England, that he might become acquainted with all the intricacies of shipbuilding and navigation. In the meantime he provided funds from the public revenue to enable young men to travel in foreign countries for the purpose of coming in touch with agricultural arts, stock raising, manufacturing, commercial enterprises, road and canal building, and the platting of cities. Some of these young men studied military arts in Germany, others philosophy, astronomy, surgery, geography, anatomy, metallurgy, and commerce in the higher institutions of different countries. William III. invited Peter to visit England, where he mingled freely with artisans and laborers and received a degree from Oxford University. Returning to Russia, he required Charles XII. of Sweden to cede the Baltic provinces. He created a navy, built seaports, and constructed vast canal systems. Previously all accounts in Russia had been kept by the abacus, but Peter introduced arithmetic, reformed dress and manners, and

equipped schools. To promote improvements in these lines he invited teachers and artisans of all kinds to his dominion.

Peter laid the foundation of Saint Petersburg on May 27, 1703. On July 8, 1709, he gained the Battle of Pultowa against the military forces of Sweden and the following year annexed a part of Finland. He married Catharine (q. v.) on March 2, 1712, at Saint Petersburg and two months later the capital was moved to that city from Moscow. He made an extended visit to European countries in 1716-17 in company with the Czarina, and soon after established the Academy of Sciences at his capital. Peter was ever zealous in carrying forward improvements, but was greatly irritated by the least opposition. His son, Alexis, became implicated in a scheme to oppose some of the reformatory plans and was tried on a charge of treason and condemned to be executed, but died before the time set for the execution. In 1722 war was declared against Persia for the purpose of opening the Caspian Sea to commerce, which resulted in the annexation of the cities of Baku and Derbend and three provinces to Russia. In the same year he established the law of sovereign succession, by which the Czarina became recognized as the heir apparent to the throne. His empress was crowned as Catharine I. shortly after his death.

PETER II., Alexeievitch, Emperor of Russia, grandson of Peter the Great, born in Saint Petersburg, Oct. 23, 1715; died there Jan. 9, 1730. He was the son of Alexis, the only male representative of Peter the Great. Catharine I. died May 17, 1727, when he was crowned emperor in accordance with a decree of Peter the Great. He became afflicted with smallpox about two years after his coronation and died soon after. He was succeeded by Anna, the daughter of Ivan, half-brother of Peter the Great.

PETER III., Feodorovitch, Emperor of Russia, grandson of Peter the Great, born in Kiel, Germany, Jan. 21, 1728; assassinated July 14, 1762. He was the son of Anna Petrovna, eldest daughter of Peter the Great, and was declared the successor to the throne of Russia by Czarina Elizabeth in 1742. Immediately he took up his residence at the Russian court and married the German princess, Sophia Augusta, who assumed the name of Catharina Alexiowna. On the death of Elizabeth, in 1762, he succeeded to the throne. He withdrew from the alliance made by Russia, Austria, and France against Prussia, sent an army of 15,000 men to aid Frederick II. of Prussia, and restored East Prussia, which had been annexed to Russia after the Seven Years' War. Soon after he recalled many of the Siberian exiles. He next formulated a plan to obtain Schleswig from Denmark, but before the design could be carried out a conspiracy against him was planned by his wife. The two lived unhappily together

and in 1762 Catharine had herself declared empress. This course came about by Peter's friendship for the King of Prussia, and because he had been liberal in regard to the church and internal affairs. Peter showed a remarkable want of energy in suppressing the insurrection that followed and took decisive measures only when it was too late. The conspirators removed him to Ropsha, where he was forced to abdicate, and was afterward strangled by Orloff, one of the conspirators. His wife succeeded him as Catharine II.

PETER I., King of Servia, born at Belgrade, Servia, June 29, 1844; died Aug. 16, 1921. His grandfather commanded an army of Servians against the Turks, who recognized him as Prince of Servia in 1812. His father, Alexander, was elected Prince of Servia in 1842. The son was educated in Hungary and France and during the Franco-German War he served in the army of France. In 1877 he sided with Russia in the war against Turkey and the following year Servia became independent. Subsequently he lived in Switzerland. When King Alexander of Servia was assassinated, in 1903, he was elected king by the general assembly. He entered Belgrade in June of that year, after an absence of 44 years. As a ruler he promoted internal improvements and nationalism, but gave evidence of much sympathy with Russia. In 1909 he assumed an aggressive policy against Austria-Hungary, when that nation annexed Bosnia and Herzegovina, and in 1914 he was expelled from Servia by the Central Powers.

PETERBOROUGH, a city of Ontario, capital of Peterborough County, 75 miles northeast of Toronto. It is situated on both sides of the Otonabe River, on the Canadian Pacific and the Grand Trunk railways, and is surrounded by a fertile farming region. Extensive water power is afforded by the river, which has a descent of 150 feet within a few miles of the city. Among the features are the high school, the county courthouse, the public library, and a bridge across the river, which connects it with the village of Ashburnham. The manufactures include leather, woolen goods, furniture, engines, and farming implements. It has a large trade in grain, lumber, pork, and merchandise. Gas and electric lighting, waterworks, and street paving are among the public improvements. Population, 1901, 11,239; in 1921, 20,994.

PETERBOROUGH, a city of England, in Northamptonshire, 35 miles northeast of Northampton. It is on the Nen River and has direct railway connections with London. It has a cathedral 476 feet long and 203 feet wide, with a tower 150 feet high. Other buildings include an art school, a public library, a corn exchange, and several churches. Locomotives, hardware, clothing, and machinery are among the principal manufactures. It has waterworks, electric lighting, sewerage, public baths, and electric street railways. The Danes destroyed it in 1807, when

it was known as Medeshamstede, but it was rebuilt and named Peterborough. In the cathedral are the remains of Queen Catherine of Aragon. Population, 1917, 32,178.

PETER THE CRUEL. See **Pedro the Cruel**.

PETER THE HERMIT, apostle of the first Crusade, born at Amiens, France, about 1050; died at the monastery of Huy, in the diocese of Liège, July 7, 1115. He descended from a good family, was educated at Paris and in Italy, and shortly after entered the army in Flanders. Later he retired from the army and, after the death of his wife, became a monk and later a hermit. In 1093 he made a pilgrimage to Palestine, where he was deeply impressed by the desperate condition of the Christians and by seeing the Holy Sepulcher in the possession of infidels. Soon after he visited Pope Urban II., who authorized him to preach in Western Europe for the purpose of organizing a confederation of Christians to possess the Holy City. After preaching for some time, an army of 30,000 men was secured, with which he marched through Hungary under continuous attacks by the Hungarians. Later he was assisted by Emperor Alexis at Constantinople. However, he met defeat in a battle against Sultan Sulyman and at the siege of Antioch decided to abandon the scheme of conquering Jerusalem, but was induced by other leaders to continue the enterprise. Jerusalem was captured by his forces in 1099. The closing incident of this Crusade was a sermon by him from the Mount of Olives to the victorious army. Soon after he returned to Europe and founded the monastery at Huy, of which he was the first prior.

PETERS, Christian Henry Frederick, noted astronomer, born in Schleswig, Germany, Sept. 19, 1813; died in Clinton, N. Y., July 19, 1890. He studied at the University of Berlin and, after spending several years in foreign travel, located in the United States, receiving a position on the government coast survey. In 1858 he was elected professor of astronomy at Hamilton College and at the same time was director of the Litchfield Observatory, at Clinton, N. Y. He was selected to conduct a party to New Zealand in 1874 to observe the transit of Venus. During his service as director the Litchfield Observatory was greatly improved and he added materially to its equipments. He recorded 20,000 spots on the sun, discovered a large number of asteroids, and investigated the orbit and nature of many comets. The catalogue prepared by him contains the record of 16,000 zodiacal stars.

PETERS, Karl, explorer, born in Neuhause, Germany, Sept. 27, 1856. He studied at Göttingen, Tübingen, and Berlin, and in 1883 published several works on philosophy. The following year he was authorized by the government to conduct expeditions to and found colonies in German East Africa and was elected president

of the German East Africa Society. Later he operated with Emin Pasha in equatorial Africa, where he explored the Tana River and penetrated to Lake Victoria Nyanza. In 1900 and 1901 he made a second tour of Africa. He published several valuable reports on the climatic conditions and the nature of the soil found in regions visited by him. He died Sept. 10, 1918.

PETER'S, Saint, the largest church in Christendom, situated in Rome, where it was founded by Julius II. in 1506. It occupies the site of the old basilica, which was built by Constantine the Great in 306 A. D. on the grave of Saint Peter, near the place where the latter suffered martyrdom. The building of a magnificent place of worship had been projected by Pope Nicholas V. in 1450, but Julius II. was the first to take decisive measures and selected Bramante as the architect to make a design. This architect died in 1513 and others had charge of the work until it devolved on Michael Angelo, in 1546. He was 72 years of age when he commenced the important work of completing the structure. He designed the dome and before his death, in 1564, had the satisfaction of seeing the dome and most of the building practically completed.

Saint Peter's was finished twenty years after the foundation was laid. The nave was completed in 1612 and the façade and portico were finished in 1614. The building was dedicated on Nov. 18, 1626, by Urban VIII. The façade is 145 feet high and 368 feet long. Saint Peter's has a length of 613 feet, the breadth across the transepts is 445 feet, and the nave is 152 feet high and 90 feet wide. The dome has a diameter of 195 feet, the height to the lantern is 405 feet, and the height to the top of the cross is 435 feet. Copies of the most celebrated paintings extant are in the building and the whole is a work of much magnificence and architectural skill. Four great arches support the dome, the finest portion of the building. A high altar is immediately under the dome, where the grave of Saint Peter is located. Monuments by Canova, Michael Angelo, and Thorwaldsen adorn the building, besides which it has a large number of statues and beautiful works of art. The famous bronze statue of Saint Peter is near the canopy, seated in a chair, with the gilded right foot extended, which devout Catholics kiss as they visit the place. The cost of the structure is estimated at \$50,000,000.

PETERSBURG, a city of Virginia, in Dinwiddie County, on the Appomattox River, twenty miles south of Richmond. It is on the Appomattox Canal and on the Seaboard Air Line, the Atlantic Coast Line, and the Norfolk and Western railroads. The place is surrounded by a region containing granite quarries and productive agricultural lands. The noteworthy buildings include the Masonic Temple, the city hall, the public library, the hospital for the insane, and the Odd Fellows' Hall. Among the

institutions of higher learning are the Southern Female College, Saint Paul's Female College, and the Protestant Episcopal School for Girls. The manufactures include tobacco products, flour, paper, cotton and silk textiles, machinery, and farming implements. It has a very extensive trade in tobacco, cotton, flour, and paper. The place was settled in 1733 and incorporated in 1748. In 1864 it was besieged for ten months by the Union forces under General Grant, and in the spring of 1865 it was evacuated by the Confederates. Population, 1900, 21,810; in 1920, 31,002.

PETERSBURG, Siege of, a noted siege in the Civil War of the United States, which was designed as the means of capturing Petersburg, Va. General Grant, after the failure at Cold Harbor, on June 3, 1864, marched with an army of 100,000 men against Petersburg, which was defended by only 2,500 Confederates. This forced the latter to withdraw a part of their army from Richmond, whence the Confederates marched to prevent the city of Petersburg falling into the hands of the Federals. General Butler conducted an assault on June 15 and on several succeeding days, but was repulsed under the leadership of General Lee, the Federals losing about 10,000 men. The noted Petersburg mine, a subterranean channel run under the Confederate fort by General Rosecrans, with a length of 520 feet, was exploded on July 30, causing a heavy Confederate loss, but when the Federals tried to enter the fort through the crater they were cut down by the thousands by the steady artillery fire of the Confederates. The situation remained practically the same at Petersburg and Richmond until March 24, 1865, when Lee made an attempt to force the Union lines and join Johnston in the south. On April 1 the Confederates were defeated at Five Forks and Grant ordered a united attack. Lee evacuated Petersburg and Richmond on April 3, 1865, after sustaining heavy losses.

PETERSON, Frederick, physician, born at Faribault, Minn., March 1, 1859. He studied in the public schools of his native city and at the University of Buffalo, N. Y., and became a professor of medical science. For some time he was head of the department of nervous diseases in the College of Physicians and Surgeons, New York City. He published "Mental Diseases," "American Text-Book of Legal Medicine and Toxicology," and "Poems and Swedish Translations."

PETERSON, William, educator and author, born in Edinburgh, Scotland, May 29, 1856. He studied in the public schools, in the University of Edinburgh, and in the University of Göttingen, Germany. A number of prominent institutions of learning granted him degrees and extended other distinguished honors. In 1895 he was made principal of McGill University, Toronto, where he filled a position of usefulness a long term of years. His publications include "The

Speech of Cicero for Cluentius," "Quintilian's Institutes of Oratory," "The Dialogues of Tacitus," and "The Relation of the English-Speaking Peoples."

PETER'S PENCE, or **Romescot**, a tax levied in memory of Saint Peter for the benefit of the Pope. It is thought to have originated with Ina, King of Wessex, in 721. The tax was paid by those possessing cattle or land, but was discontinued in England in 1365, and in 1534 it was prohibited by an act of Parliament. The tax was only one penny for each family, but this was really a large amount, as the value of a day's labor was only a penny. When the Pope lost temporal power by the Revolution of 1848, the tax was revived as a voluntary contribution in several countries, and there have been large funds accumulated in this manner. In 1877, when the jubilee of Pius IX. was celebrated, the sum raised amounted to \$3,300,000.

PETITION (pě-tish'ŭn), an appeal by one or more persons to any organized body or branch of the government, in the form of a written request, praying that a certain grace or right be granted. The right of petition is recognized by most governments as a natural right, and is regarded a fit and convenient means by which the citizen may place before public officials causes and grievances of importance. The Congress of the United States is prohibited from making any law to abridge "the right of the people peaceably to assemble and to petition the government for a redress of grievances."

PETITION OF RIGHTS, a celebrated declaration formulated by the British House of Commons in 1628, which was presented to Charles I. It was formulated for the purpose of limiting the powers of the crown, and obtaining a freer exercise of the personal and civil liberties in the nation. This document was not a new law, but rather a rehearsal of the statutes that had been disregarded by the king, and requested that the ancient rights of the people should be confirmed. It recited the more important provisions of the Magna Charta and called attention to certain statutes passed in the reigns of Edward I. and Edward III., particularly those that prohibited forced loans and unlawful taxes and assessments, illegal arrests and imprisonments, a resort to martial law in civil cases, and quartering soldiers upon the premises of private citizens without their consent. At first the king eluded the petition and his subjects were ordered not to meddle with affairs of state. However, the Commons proceeded to take up charges against Buckingham, one of the advisers of the king, and the latter was compelled to yield and assent to the petition.

PETOSKEY (pě-tōs'kĭ), a city of Michigan, in Emmet County, 42 miles southwest of Sheboygan. It is on Little Traverse Bay, an inlet from Lake Michigan, and on the Père Marquette and the Grand Rapids and Indiana railways. Petoskey has a large inland and lake trade and is pop-

ular as a summer resort. The chief buildings include the Lockwood Hospital, the Petoskey Normal School, and several churches and public schools. Flour, leather, lime, and machinery are among the chief manufactures. It has electric lighting and public waterworks and carries a large trade in merchandise. The place was incorporated in 1878 and became a city in 1896. Population, 1905, 5,186; in 1920, 5,064.

PETRARCH (pē'trärk), **Francesco**, distinguished poet and scholar, born in Arezzo, Italy, July 20, 1304; died July 18, 1374. His parents were exiled from Florence at the time of his birth along with Dante and others, owing to their affiliation with the party of the Bianchi, and his early life was spent in Tuscany. His father removed to Avignon in 1312, where young Petrarch secured his early education, but later studied law at Montpellier and Bologna. After the death of his father, in 1326, he returned to Avignon for the purpose of devoting himself to the study of Latin classics and in the meantime took a course in theology, but not particularly with the view of taking holy orders. On April 6, 1327, he met Laura, a golden-haired French woman, for whom he immediately developed a pure and tenderly romantic passion. She was then nineteen years of age and had been the wife of Hugo de Sade, a gentleman of Avignon, for two years. Ever after he sang of his Platonic love for this woman, and frequently met her in society and at church. The sonnets of love were so beautiful that they charmed his contemporaries, and induced Charles IV. to seek an introduction to the object of the poet's praise.

In 1338 Petrarch left Avignon for Lombez, where he spent most of his time in literary pursuits. His learning and genius attracted the attention of the leading scholars of his time, his Latin works being those upon which his fame principally rests. In 1341 he visited Rome, and while there on Easter Day the senate crowned him with the wreath of the poet laureate. His scholarship was as profound as his poetic genius was remarkable, and he spent much time in traveling in different countries to collect materials for his writings, visiting in the meantime the chief cities of Italy, Spain, Germany, and France. While at Parma he was informed of the death of Laura, of which he made note on his copy of "Virgil." He finally settled at Aquá, near Padua, where he spent the closing years of his life in constant literary work. His life and writings exhibit a rational piety. Among his productions are some of such value that he is regarded by many writers as one of the most important figures in the revival of learning. The principal works include his "Epistolae," containing his letters to friends and acquaintances; "Africa," an epic poem on the subject of the Second Punic War; and many excellent poetic works. Many translations have been made from the works of Petrarch. Several extensive commentaries are based on his writings.

PETREL (pět'rěl), a genus of sea birds. They include many species, all of which have webbed feet and long and strong wings. The nasal tubes are united, the beak is as long as the head, and the upper mandible is hooked. They live almost constantly on the ocean. The petrels that frequent the high seas are rarely seen on the land, coming to shore only to lay their eggs and rear their young. The color is dusky and varied with white or gray, and most of the species are of small size. They feed on mollusks and may be seen upon the water when it is disturbed by storms, for the reason that many of the animal forms upon which they feed rise to the surface at that time. Among the familiar species are the *stormy petrel*, the cosmopolitan *Wilson's petrel*, and the northern *Leach's petrel*. The stormy petrel is sometimes called *Mother Carey's chicken*, and is one of the smallest web-footed birds, being only about the size of a lark. These birds are so named because they appear to be walking or running on the water, the term being applied from the Apostle Peter's walking on the water.

PETRIE (pē'trè), **William Matthew Flinders**, Egyptologist, born at Charlton, England, June 3, 1853. He attended a private school, turned his attention to archaeology, and was employed in exploring and measuring British earthworks. In 1880 he went to Egypt to investigate the ruins and antiquities of that country, and while there excavated the sites of Daphne and Tanis. He worked at Fayûm from 1888 to 1890, where he found several interesting funeral portraits and gathered valuable papyri at the ruins of Gurob and Kahun. He worked for the Palestine Exploration Company in 1890-91, when he discovered and excavated the site of several ancient cities. During his explorations in Egypt he discovered the remains of a prehistoric race at Nagada and located the ruins of the Greek city of Naukratis, in the Nile delta. Among his numerous publications are "Inductive Metrology," "Pyramids and Temples of Gizah," "Ten Years' Digging," "Religion and Conscience of Ancient Egypt," and "A History of Egypt."

PETROGRAD. See **Saint Petersburg.**

PETROLEUM (pē-trō'lē-ŭm), an inflammable liquid substance found in many localities by boring into the earth's crust, but in some places it rises through natural channels and forms springs. It is frequently called mineral oil, rock oil, coal oil, natural oil, and seneca oil, the names differing in the trade of different countries. To secure the petroleum, wells are sunk into the earth by drilling tools, much like those used for artesian wells. The depth differs greatly with localities, ranging from a few feet to several thousand feet below the surface. The oil comes to the surface in some localities, being forced out by a gas always found in connection with it, but in some cases it must be pumped much like water from an ordinary well. *Crude petroleum*, as it is called when it comes

out of the ground, has a dark brown to greenish color and in its native state has a disagreeable odor. From the wells it is transferred into great tanks by means of iron pipes and it is then taken through pipes into refineries, where it is distilled. In some of the Pennsylvania and Ohio oil regions several thousand miles of pipes are used to carry it to the refineries.

The crude petroleum yields different classes of products by distillation, the principal ones being gasoline, naptha, benzine, kerosene, lubricating oil, and paraffine. *Gasoline* is used for mixing with coal gas and making gas; *naphtha*, for making oil cloths and cleaning kid gloves and clothing; *benzine*, in making varnishes and paints; *kerosene*, for burning in lamps; *lubricating oil*, for oiling or greasing machinery; and *paraffine*, for making waterproof cloths, chewing gum, candles, and matches. Petroleum is used to a considerable extent as fuel for furnaces and en-

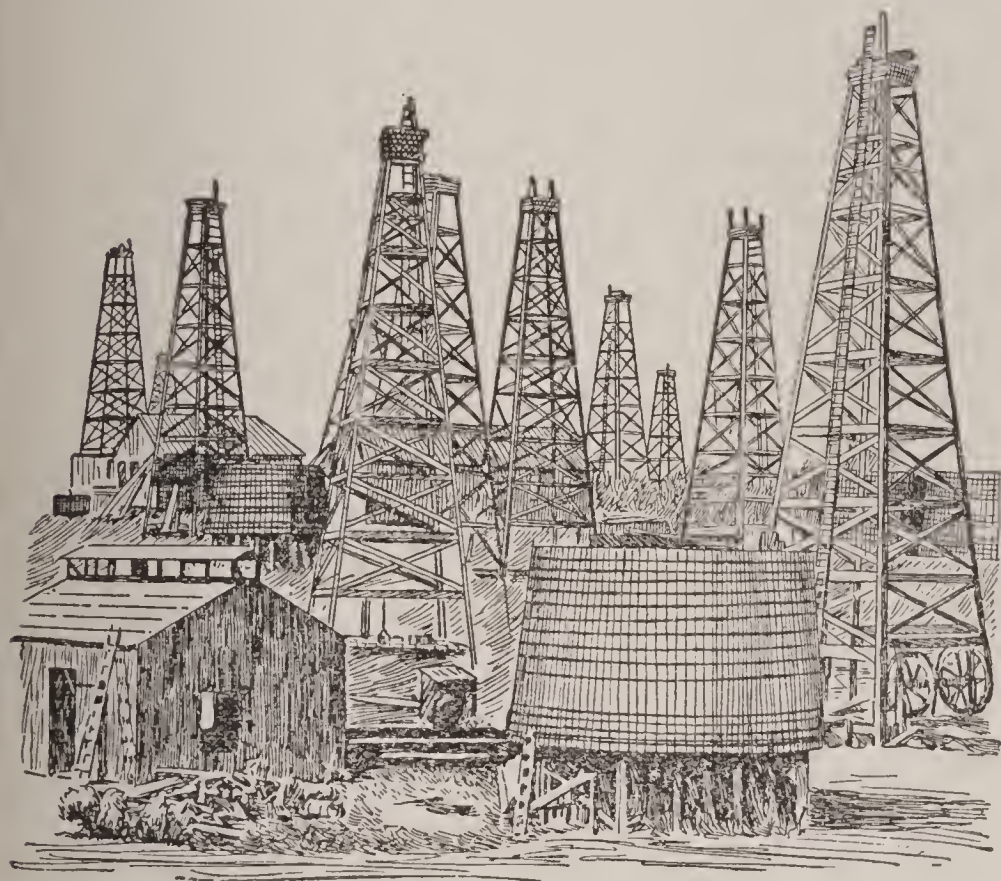
origin. However, some writers think it was formed in the depths of the earth by the chemical action of water on heated carbides. It occurs in rocks of all ages.

The United States and Russia are the largest producers of petroleum. Although the output in these countries was about equal for some years, the United States is taking precedence as the largest petroleum-producing country in the world. It is likewise obtained in large quantities in India, Austria, the Dutch East Indies, Canada, Rumania, and Japan. The principal oil wells of the United States are in Oklahoma, West Virginia, California, Kansas, Ohio, Texas, Louisiana, Pennsylvania, Wyoming, and New York. However, Oklahoma, California, Texas, and Illinois have the largest yield. Deposits have been discovered in several other states and in Alaska. The deposits of Canada are found principally in Ontario, British Columbia, and Yukon. The American product is considered the most valuable, since it yields a larger proportion of refined oil per barrel and sells about ten per cent. higher than that produced in competitive countries. The annual production of the United States is about \$368,500,000 barrels and has a value of \$260,500,000. Much of this product is consumed in the manufactures and for household uses, while a large per cent. is exported annually. It is equally serviceable for lighting and heating.

PETTIE (pět'tī), **John**, painter, born in Edinburgh Scotland, in 1839; died Feb. 21, 1893. He studied in the Royal Scotch Academy and soon after made exhibits in Edinburgh and London. His works of the highest quality include "Witchcraft," "The Disgrace of Cardinal Wolsey," "The Drumhead Court-Martial," "The Prison Pet," and "The Jacobites in 1745."

PETTIGREW (pět'tī-grōō), **Richard Franklin**, public man, born in Ludlow, Vt., July 23, 1848. In 1854 his parents removed to Wisconsin, where he attended the Evansville Academy, and in 1866 he entered Beloit College. In 1869 he graduated from the University of Wisconsin and the same year located in Sioux Falls, S. D., where he began the practice of law. He was elected to the Dakota Legislature shortly after, and in 1881 was chosen as delegate to Congress from Dakota Territory. When South Dakota was admitted as a State, he was elected to the United States Senate, and was reelected in 1895. Pettigrew ranked as an active and influential member of Congress. He left the Republican party in 1896 and opposed the policy of the administration in annexing the Philippine Islands.

PETTUS, **Edmund Winston**, public man, born in Limestone County, Alabama, July 6, 1821; died July 27, 1907. He attended the pub-



OIL WELLS AND TANKS AT BEAUMONT, TEXAS

gines, but it is somewhat objectionable on account of being extremely smoky. In some regions a large amount of natural gas (q. v.) accompanies petroleum, when it is used extensively for lighting purposes.

Petroleum was known to the ancients, but it was not produced to any considerable extent until 1859, when a boring at Oil City, Pa., led to the discovery of a well that yielded 400 gallons a day. Pliny describes its use in lamps and Genoa was lighted by the product secured from the wells of Amiano at about the time of Tacitus, Pliny, and other Roman writers. The American Indians collected petroleum that exuded from the ground, which they sold as *seneca oil* for medical purposes, especially for rheumatism. Geologists generally agree in the opinion that petroleum has been formed by the decomposition of organic matter, either of animal or vegetable

lic schools in his native State and Clinton College, Tenn., and was admitted to the bar in 1842. For some time he practiced his profession at Greenville, Ala., and served as lieutenant in the Mexican War. In 1849 he went to California with a party of gold seekers. During the Civil War he served in the Confederate army, attaining the rank of brigadier general. In 1878 he was elected as a Democrat to the United States Senate and was reelected in 1903. Both in State and national politics he exercised a wide influence upon the policy of his party.

PETUNIA (pě-tŭ'nĭ-à), a genus of plants of the nightshade family, which are native to the warmer parts of America. The leaves are entire and somewhat resemble those of tobacco, especially in having the sticky surface and in emitting a disagreeable odor when crushed. The plants are perennial herbs, and the flowers are either single or double. They are cultivated



SINGLE FLOWERING PETUNIA.

extensively in gardens and in greenhouses, where they are grown chiefly as annual plants, since they bloom early. The *Countess of Ellesmere* is a choice species with a deep rose-colored flower. Many other favorite species have been developed by florists.

PEWTER (pŭ'tēr), an alloy of several kinds of metals, made chiefly of tin and lead. To these metals others are sometimes added, such as copper, which makes the alloy harder and sonorous; antimony, which hardens and gives a silvery luster, and zinc, which serves to cleanse the alloy. No regular proportions are necessary, but a fine product is obtained by using 17 parts of antimony to 100 parts of tin. The best grades contain about one-fifth of lead, the remainder being tin, and in this proportion they

are used for plates and dishes. Vessels to contain wine and vinegar are usually made of 82 parts tin and 18 parts lead. Pewter is used for spoons, mugs, plates, and other household utensils. It is employed for many purposes in the arts, especially by engravers and lapidaries.

PFORZHEIM (ptōrts'hīm), a city of Germany, in the grand duchy of Baden, at the confluence of the Enz with the Würm, 21 miles southeast of Karlsruhe. It is on the northern border of the Black Forest. The principal buildings include a Gothic church, the public library, the townhall, an industrial school, and the government building. It has manufactures of jewelry, chemicals, leather, machinery, and electrical apparatus. The streets are well improved with stone and macadam paving. Communication is furnished by steam and electric railways. Population, 1905, 59,389; in 1920, 69,084.

PHAEDO, or **Phaedon**, Greek philosopher, who flourished in the time of Socrates, about the 4th century B. C. He was of noble birth, a native of Elis, but was taken captive and sold as a slave in Athens. Afterward he was released through the influence of Socrates, who became his firm friend. His name is given by Plato to the dialogue on the death of Socrates. After the death of the latter, he returned to Elis and founded the Elean school of philosophy.

PHAEDRA (fě'drà), in Greek mythology, the wife of Theseus and the daughter of Minos, King of Crete, and a sister of Ariadne. She fell in love with Hippolytus, her step-son, who did not reciprocate her passion, and she falsely accused him to his father of trying to kidnap her. Theseus thereupon cursed Hippolytus and asked Neptune to destroy him, which prayer the god complied with. When the innocence of Hippolytus became known Phaedra hanged herself, or, according to some, was put to death by her husband. Sophocles and Euripides made the story of Phaedra the subject of tragedies.

PHAEDRUS (fě'drŭs), a Latin poet and writer of fables, born about thirty years before the Christian era. He was taken in childhood from Macedonia to Rome, where he became connected as a servant with the court of Augustus, by whom he was freed. Besides translating many fables from the Greek into the Latin, he wrote a large number of original fables and poems. Ninety-seven fables ascribed to him are extant.

PHAËTHON (phā'ë-thōn), or **Phaëton**, in Greek legend, the son of Helios, the sun-god, and of Clymene. He is described as a beautiful youth, but his heart was filled with vanity. At his persistent entreaty Helios permitted him to attempt to drive the chariot of the sun for one day. When Dawn, the sister of Helios, opened the doors of the rosy east, the horses were yoked to the chariot and Phaëthon's face was

anointed with the balm so he could withstand the burning heat, and immediately mounted the chariot. As he was unaccustomed to the arts of a charioteer, the fiery steeds soon passed from his control, causing the mountains and forests of the earth to be set on fire. Zeus sent a thunderbolt to stop the steeds, which hurled the youth headlong into the Po River. His sisters, the Heliades, wept so long for him that Zeus transformed them into poplars, and their tears were converted into transparent amber.

PHAËTON (fā'ê-tŏn), a kind of carriage for pleasure driving. It has a low body and wheels, is drawn by one or two horses, and is somewhat smaller than a buggy. Vehicles of this kind are used extensively for driving in parks, especially the *spider phaëton*, which somewhat resembles a carriage.

PHALANX (fā'lānks), the order of battle in which the heavy infantry of Greece was formed. It consisted of a series of unbroken lines several ranks deep, usually from eight to sixteen ranks, and the men were armed with lances from eight to fourteen feet long. The Spartan phalanx was eight ranks deep, while the Theban and Macedonian were much deeper.

PHANEROGAMOUS PLANTS (fān-ēr-ŏg'ā-mŭs), or **Phanerogams**, the name of a division of the vegetable kingdom, including the flowering plants. These plants are called *phaenogams*, by some writers, to distinguish them from the *cryptogams*, but the more general name used at present is *spermatophytes*. To this division belong nearly all of the plants that are useful to man and fully 100,000 species have been described and classified. They reproduce by seeds that contain an embryo, hence differ greatly from the cryptogams, which reproduce by spores composed of simple cells that do not have an embryo.

PHARAOH (fā'rŏ), a name applied by the Scriptures and many Hebrew writers to the rulers of Egypt. It is used as if it were a proper name, but it is only an official title, as *shah* is a title of the Persian rulers, *khan* of the Tartars, and *czar* of the Russians. The title corresponds to the *Ph-Ra* found on the monuments of Egypt, which signifies the sun. It is quite difficult to determine the particular monarch to whom reference is made by the use of this title, but generally the application is to the Egyptian king under whom Joseph flourished, and the line under whom the oppression of the Israelites and the exodus took place.

PHARISEES (fār'ī-sēz), a school or sect among the Jews, which possessed much influence during the ministry of Christ. The chief aim of this sect was to preserve the sacred religion of their fathers by resisting all Grecian and other foreign influences. Writers agree that the name was derived from *perushim*, a word meaning separatists, which was used to distinguish them from the priestly aristocracy known as the *Sadducees*. The Pharisees repre-

sented a national party of great strength in politics and religion at the time of Christ, and they are mentioned in connection with many of the events associated with Christ and recounted in the New Testament. Their fundamental principle involved the support of both law and sacred tradition, holding that Moses on Sinai came into possession of both written and unwritten law, which he passed to the elders and prophets through Joshua.

The unwritten law of the Jews included the traditions that operated to explain the written law, and in addition to the traditions received from Moses there were others established by the prophets, by wise men, and by decisions of the Great Synagogue. The Pharisees believed that the dead would be resurrected and enjoy future immortality, while the Sadducees thought that the Scriptures did not warrant such a conclusion, and they rejected many of the traditions held by the Pharisees. The *scribes* were teachers and doctors of law that arose from the Pharisees. They were classed as the most learned of the Israelites, and to them were intrusted many positions of importance by the Hebrews and by foreign rulers of later times. In the administration of the law the Pharisees were more liberal than the Sadducees, but their devotion to law and tradition led them to foster exactness in details and lose spiritual life and energy. This tended to lead to self-glorification, though the real Pharisee was one "who did the will of his Father in Heaven, because he loved Him." As a class they were learned and pious, and most of the writers and commentators of their times belonged to this sect. In the teachings of Christ they are represented as proud, intolerant, and hypocritical.

PHARMACOPOEIA (fär-mā-kŏ-pē'yā), the name applied to a book of formulas and directions for the preparation and use of drugs in the treatment of diseases. Such a book may be compiled either by individuals or by a commission under the direction of the government. Most works of this kind consist of two parts, a list of drugs and the tests for determining their purity, and a collection of receipts or prescriptions to compound them for the treatment of diseases. A national pharmacopoeia is in use in nearly every civilized country, but those of France, Germany, and the United States are the most extensive. In nearly all cases these books are prepared by national conventions, at which the medical colleges and societies are represented by delegates. The first work of the kind was prepared in 1542 at Nuremberg, Germany, and revisions of this and others have appeared from time to time. Conventions are held from time to time at Washington, D. C., to revise the pharmacopoeia in use in the United States. The first edition was published in 1820 and successive issues have appeared about every ten years. It is required that pharmacists and physicians be well acquainted with this work,

both for the good of the medical practice and because it is authorized by the legislatures of states and the laws of Congress.

PHARMACY (fär'mà-sỹ), the branch of medicine that treats of the preparing, compounding, and preserving of drugs and other substances for medical purposes. The substances used by a pharmacist include numerous preparations derived from the animal, vegetable, and mineral kingdoms; hence it is necessary that one engaged in pharmacy should possess a knowledge of zoölogy, botany and mineralogy, and that he be skilled in determining the chemical constituents of drugs. In most European countries the general government exercises authority in regulating and supervising the pharmaceutical practice, but in the United States such authority is vested in the several states. Pharmacy has been elevated to a high standard in America, where, as a whole, it is more efficient than in the states of Europe. Many accredited schools and colleges of pharmacy are maintained, or departments of pharmacy are devised in the institutions of higher learning, at which students receive training in chemistry, botany, materia medica, and allied branches of study. It is required in most instances that applicants for admission to practice pharmacy must be graduates from an acknowledged school, while in others a critical examination under a board of pharmacy is necessary before being admitted to practice.

PHAROS (fā'rōs), the ancient name of a small island off the coast of Egypt, near the city of Alexandria. It was connected with the mainland by a mole and was famous for its lighthouse which was considered one of the seven wonders of the ancient world. This lighthouse, or Pharos, was erected by Ptolemy I. and his son, Ptolemy Philadelphus, and was finished about 282 B. C. It had a square base measuring about 100 feet on a side and, according to some writers, was 400 feet high. In 1303 it was destroyed by an earthquake, having stood intact about 1,600 years. The island has been modified by the action of the elements so as to form a peninsula. It is now partly occupied by the city of Alexandria.

PHARYNX (fär'ĩnks), the muscular, membranous sac located between the lower part of the mouth and the oesophagus. It is wider above than below and is suspended from the base of the skull, opening below the oesophagus and larynx. The pharynx has seven openings, four above and three below the soft palate. The for-

mer consists of two openings leading forward to the nostrils and the two Eustachian tubes to the middle ears, and the latter include one to the mouth, one to the larynx, and one to the oesophagus. It is essential in modifying or producing the higher tones of the voice and in swallowing.

PHEASANT (fěz'ant), a genus of birds found originally in Asia, but brought to Europe at an early date in history. They were introduced to North America from Europe. The pheasants include a number of species and with them are usually associated the numerous allied birds, all of which are highly prized as game birds. In all species the bill is short and curved, the skin surrounding the eyes is destitute of feathers, and the male has a spur on the tarsus.



GOLDEN AND SILVER PHEASANTS.

The males of the *common pheasant* have beautiful plumage and attain a length of three feet from the tip of the bill to the end of the tail, fully half of this comprising the tail. In the female the plumage is less beautiful and the tail is much shorter. Most males have the plumage variously colored, ranging from greenish-purple and brown to golden-red with shades of black, while the females have yellowish-brown plumage.

Pheasants may be domesticated, in which state they breed freely, and they interbreed with the common fowl, guinea fowl, grouse, and other birds of this class. In a wild state they roost largely on the low branches of trees, or in the undergrowth, and feed on seeds, insects, worms, berries and tender parts of plants. The name is sometimes applied to the ruffed grouse and the partridge of North America, the lyre bird of Australia, and other birds, but it applies more correctly to the common pheasants of Asia described above. Foremost among the European species is the *English pheasant*, in which the male is provided with beautiful plum-

age, shaded chiefly with red, black, and orange. The female, which is somewhat duller, lays from ten to fifteen eggs, usually in a thicket or dense hedge. The *golden pheasant*, *impeyan pheasant*, and *argus pheasant* are other distinct species.

PHELPS (fělpz), **Elizabeth Stuart**, authoress, born in Andover, Mass., Aug. 13, 1844. Her father, Austin Phelps (1820-1890), and her mother, Elizabeth Stuart Phelps (1815 - 1852), were writers of considerable reputation and produced many interesting and popular works. The daughter was educated at Andover, but received much instruction in literature from her father. She began writing by contributing to several periodicals, and in 1864 published her first book, "Ellen's Idol." From this time she was a studious and prolific writer, giving to literature many fine works in an animated, earnest, and fluent style. In 1876 she delivered a course of lectures on reformatory themes to the students of Boston University. She married Rev. Herbert B. Ward, son of William Hayes Ward of the *New York Independent*, in 1888. Among her many excellent productions are "The Gates Ajar," "The Story of Avis," "Old Maid's Paradise," "Beyond the Gates," "Struggles for Immortality," "Songs of the Silent World," "The Silent Partner," "Doctor Zay," and "Hedged in." "The Gates Ajar" is one of the best known of her productions and has been widely translated. She died Jan. 28, 1911.



ELIZABETH STUART PHELPS.

PHELPS, **William Walter**, statesman, born in New York City, Aug. 24, 1839; died in Englewood, N. J., June 16, 1894. He graduated from Yale University in 1860. After graduating from Columbia Law School in 1863, he began a successful practice at Englewood, N. J. In 1872 he became a fellow of Yale University, was elected to Congress from New Jersey in the same year, and at once attained a reputation as a speaker. President Garfield appointed him minister to Austria in 1881, but when the administration changed, in 1882, he resigned and was again elected to Congress. President Harrison appointed him minister to Germany, in which position he served from 1889 until 1893. He was a regent of the Smithsonian Institution for a number of years.

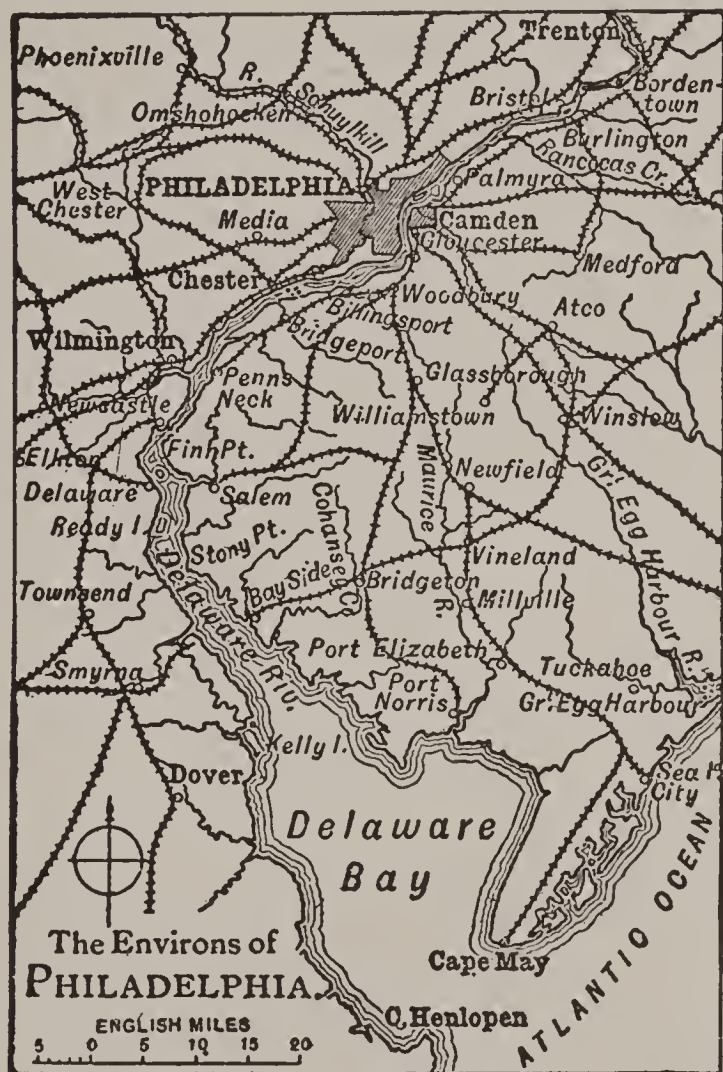
PHI BETA KAPPA, a Greek letter society, founded in 1776, having chapters in many American colleges and universities. It is named from the letters of its motto, *Philosophia Bioi Kubernetes*, meaning in English, "Philosophy is the guide of life." The society was organized by undergraduates of William and Mary College, at Williamsburg, Va. At present the membership is 18,500. The chapters are governed by the national council of twenty senators and delegates from the various chapters. Meetings are held triennially, in the years 1907, 1910, etc.

PHIDIAS (fĭd'ĭ-ās), distinguished Grecian sculptor, born at Athens about 500 B. C.; died about 432 B. C. His early training was under the direction of his father, Charmides, of Athens. By reason of living at a time when Pericles had resolved to beautify Athens with excellent public buildings and temples and to fill them with fine works of art, favorable opportunities to produce masterpieces were at once opened to him. Pericles entrusted work of great value to him, and allowed him much latitude in planning and superintending improvements and adornments in the city. Among his work was the celebrated statue of the Olympian Zeus (Jupiter), which was nearly sixty feet high and stood in the temple of Zeus at Olympia. It was of ivory and gold and was such a masterpiece of art that it was reckoned among the seven wonders of the world. This statue represented the god seated on a throne, holding in his right hand a life-sized image of the Goddess of Liberty and in his left a royal scepter surmounted by an eagle. It is said that the great sculptor had concentrated all the marvelous powers of his genius on this sublime conception, and earnestly entreated Zeus to give him a decided assurance that his labors were approved, in response to which a flash of lightning is said to have come through the open roof of the temple. Other masterpieces were three statues of Athene. One of these in bronze represented the goddess in the attitude of battle; another in the Parthenon, made of ivory and gold, represented the goddess as an image of victory; and the third in bronze was constructed to personify the beautiful. Many of the excellent works of art that made Athens famous during the age of Pericles were either executed by Phidias or outlined by him. The statue of Zeus was removed by Emperor Theodosius I. to Constantinople, where it was destroyed by fire in 475 A. D.

PHILADELPHIA (fĭl-ā-děl'fĭ-ā), the largest city of Pennsylvania and the third in population in the United States, being exceeded only by New York and Chicago. It is coextensive with Philadelphia County, with an area of 130 square miles, and is 135 miles northeast of Washington, D. C. The city is pleasantly located on the west bank of the Delaware, immediately above where it is joined by the Schuylkill, about 50 miles from the mouth of the Delaware. Its extent from north to south is about 22 miles, the width is from five to

ten miles, and the general elevation above sea level varies from 24 to 443 feet.

DESCRIPTION. The city was originally platted on a narrow tract of land between the Delaware and Schuylkill rivers, where the leading business and industrial centers are located. At first the growth was largely confined to a tract lying along the Delaware, but later it extended beyond the Schuylkill to Cobb's Creek and northward to the line of Montgomery County. The streets are platted with much regularity and those running north and south are parallel to Broad Street, while those running east and west are parallel with Market Street. In some places the regularity is broken by the rivers and by outlying sections, especially in the north-western part and along the Schuylkill. The streets running north and south are numbered, the numbers beginning with the one nearest



the Delaware, while the east and west streets are named. The buildings in each block are numbered consecutively from one to 100, each block beginning with a new hundred, and the directions north, south, east, and west are indicated by letters, hence it is easy to find the location of any particular building. Some of the streets of the older part are narrow, but the newer sections and the residential portion have wide thoroughfares. At present the city has about 1,650 miles of streets, of which more than half are substantially paved with asphalt, brick, or stone. The part of the city lying beyond the Schuylkill is known as West Philadelphia.

From the fact that Philadelphia was settled by William Penn and many people belonging

to the Friends, it is popularly called the *Quaker City* and the *City of Brotherly Love*. Sometimes it is referred to as the *City of Homes*, since a larger proportion of small houses occupied by their owners is found here than in any other city of America. As a whole the architecture is substantial, but many of the older buildings are of red brick and ornamented with marble trimmings. In the newer residential sections are many fine homes, built largely of granite and limestone, and the residences are beautified by fine parkings and avenues of trees. Germantown and Chestnut Hill, both in the northwestern part of the city, are among the many beautiful and attractive suburbs. The rivers are crossed by substantial stone and steel bridges, connecting the different parks and suburbs for easy access.

BUILDINGS. The city has two classes of noted buildings, those associated with the early history of the country, and those that may be classed among the large modern structures. Independence Hall, located on Chestnut between Fifth and Sixth streets, was commenced in 1731 and completed in 1735. This structure was the scene of many noted events in the Colonial and Revolutionary period. It was the meeting place of many sessions of the Continental Congress, and here the Constitution of the United States was framed. The Old Liberty Bell, which rang out the news of the adoption of the Declaration of Independence, and many documents and articles of furniture dating from the time of Washington are in this building. Carpenter's Hall, a structure of red brick with black glazed headers, on Chestnut Street between Third and Fourth, was the first meeting place of the First Continental Congress, in 1774. On Arch Street, above Fourth, is the historical house of Betsy Ross, who here made the first American flag. Christ's Church, on Second and Market streets, stands in the cemetery that contains the remains of Benjamin Franklin and other noted personages. Other structures of an early date include the Girard National Bank, built for the first bank of the United States; the London Coffee House, at the corner of Front and Market streets and frequented by the prominent men in Revolutionary times; and the Old Swedes' Church, erected in 1700.

The more recent buildings of the city are chiefly of stone, in which the modern steel frame is employed. These include the city hall, known locally as the Public Buildings. This structure covers over four acres and furnishes accommodations for the county and Federal courts and the county and municipal officers. It was erected and equipped at a cost of \$25,250,000. The United States mint, on Spring Garden Street; the customhouse, on Chestnut Street; and the post office, covering an entire block, are among the larger public buildings. At Thirteenth and Locust streets is the elegant build-

ing of the Pennsylvania Historical Society, one of the foremost associations of its kind in America. The arsenal is near the Schuylkill, a short distance below South Street. Among the large modern structures may be mentioned the Drexel building, the Commonwealth Trust building, the Real Estate building, the Land Title Annex, the Detz building, the Arcade building, the Masonic Temple, the Provident building, the Odd Fellows' Hall, and the Y. M. C. A. building. The Board of Trade has its headquarters in the Bourse building, which contains a commercial library and museum. Handsome railroad stations are maintained by the Reading and the Pennsylvania railways, that of the latter company having a train shed over 700 feet long. Among the principal hotels are the Walton and the Bellevue-Stratford, both located near the city hall.

CHURCHES AND INSTITUTIONS. All the leading Christian denominations are well represented. The principal ecclesiastical structures include the Holy Trinity (Episcopal), the Baptist Temple, the Roman Catholic cathedral, the First Presbyterian, the Kenneth Israel Synagogue, and the Friends' Meeting House. It is the seat of the University of Pennsylvania, which is at the head of public instruction in the State. The elementary and high schools are thoroughly organized and with them are affiliated manual training schools and normal schools for teachers. Girard College, Drexel Institute, and the Roman Catholic high school are among the noted educational institutions. Many of the religious organizations maintain secondary schools. A number of educational and scientific associations are well represented. In addition may be mentioned the Franklin Institute and the Academy of Natural Sciences.

The public library has about fifteen branches in different parts of the city and to it belong about 260,000 volumes. Benjamin Franklin organized the library movement in 1731 and the collection gathered through this source is in the hands of what is known as the Library Company, which has about 200,000 volumes. Other collections include those of the Carpenters' Company, the Drexel Institute, the American Philosophical Society, and the seminaries and collegiate institutions. Many hospitals and charitable institutions are maintained, including the Pennsylvania Hospital, the Municipal Hospital, and the charities founded under the direction of the Methodists, Roman Catholic, Episcopal, Lutheran, Presbyterian, and Jewish churches. Stephen Girard left large endowments in support of orphans and these now amount to about \$17,500,000, the income of which is distributed under the direction of a municipal committee.

COMMUNICATION. Philadelphia is the focus of many railways and extensive electric lines. The Pennsylvania, the Philadelphia and Reading, the Baltimore and Ohio, and the Lehigh

Valley railways are among the principal roads that enter the city. Ocean vessels enter the harbor on the Delaware River, which has been deepened and has a frontage of eighteen miles within the city. Boats of light draft ascend the Schuylkill for some distance. Urban and inter-urban communication is furnished chiefly by a system of electric street railways, which have lines that approximate 500 miles within the city. With this system are connected many inter-urban electric railways. A subway system of four tracks extends from the Schuylkill to the Delaware and an elevated extension furnishes transportation along Market Street. The city is well lighted with gas and electricity and has extensive systems of sanitary sewerage and waterworks.

PARKS. About 4,000 acres are included in the parks. Fairmount Park, on both sides of the Schuylkill, is the finest pleasure grounds. It is divided by the river into East Park and West Park, the former containing 633 and the latter 1,320 acres. The Wissahickon Valley Extension, located along the Wissahickon, contains 1,010 acres and has much natural scenery of great beauty. Many fine monuments and objects of historical interest are seen in Fairmount Park. These include the cottage of William Penn, formerly located near the river on Letitia Street, which is the first brick structure erected in the city. Morris's Hill, the original Fair Mount, is an elevated tract of five acres. Lemon Hill contains the building in which Robert Morris resided at the time of the Revolution. Washington Monument by Siemering of Berlin, Germany, stands at the Green Street entrance to the park. It was erected by the Cincinnati Society at a cost of \$250,000. Within the park are statues of Grant, Lincoln, Goethe, Schiller, Humboldt, Joan of Arc, Columbus, and Garfield. Many small streams and lakes ornament the park and it is beautified by numerous drives and boulevards. The chief points of interest within the city may be reached by a trolley line. In addition there are many smaller parks, such as League Island Park and Bartram's Gardens, which contains a fine botanical collection. The squares include Central Square, Independence Square, and Penn Treaty Square, the last mentioned being the site of the elm under which it is said Penn made a contract with the Indians.

MANUFACTURES AND COMMERCE. In the output of manufactures the city holds third rank, being exceeded only by Chicago and New York. It was the leading manufacturing center until 1890. In the output of leather it holds first place and is second in the manufacture of cigars and clothing. However, the products from its foundries and machine shops rank highest in value among the products of the city, which is due largely to an abundance of iron and coal within easy reach. The Baldwin Locomotive Works, on North Broad Street, is one of the largest establishments in America. The Cramp

shipyard, near Port Richmond, is a large enterprise and has completed some of the best vessels made in the United States. In the output of woolen and cotton goods, chemicals, and blank books the city takes a high rank. Other manufactures include clothing, carpets, hosiery, boots and shoes, paper hangings, furniture, spirituous liquors, and lumber products. The city has vast printing and publishing establishments. It has a large domestic and foreign trade in grain, live stock, fruits, packed meats, lumber, and cotton and woolen goods.

HISTORY. The first settlements on the site of Philadelphia were made by Swedes, but William Penn founded the city in 1682, and it became the capital of Pennsylvania the next year. In colonial times it ranked as the most noted center of civil interests for the colonists, and there assembled the Continental Congress of 1774, so famous in history. On July 4, 1776, the Declaration of Independence was adopted in Philadelphia; on July 9, 1778, the Articles of Confederation were signed; and in 1787 the Constitution of the United States was prepared. Philadelphia was the capital of the Federal Union from 1790 to 1800, and the capital of Pennsylvania from 1683 until 1800. The first American bank was established here in 1781 and the first United States mint was founded in 1792. The Centennial celebration of the independence of the colonies was held in Philadelphia in 1876, and in 1882 the bicentennial of the landing of William Penn was observed. In 1683 Philadelphia had about 80 houses and a population of 500. The census returns made since the adoption of the Constitution give the population as shown in the following table:

YEARS.	POPULATION.	YEARS.	POPULATION.
1790.....	28,522	1860.....	565,529
1800.....	41,220	1870.....	674,022
1810.....	53,722	1880.....	847,170
1820.....	63,802	1890.....	1,046,964
1830.....	80,458	1900.....	1,293,697
1840.....	93,665	1910.....	1,549,008
1850.....	121,376	1920.....	1,823,779

PHILAE (fī'lê), an island of the Nile, located near the boundary between Nubia and Egypt, between the first cataract and Assuan, about five miles south of the latter. By the Egyptians it is called Menlak, meaning the place of the cataract. The island is chiefly of granite formation and is noted for its ancient architecture, dating from about 377 B. C. It has several celebrated structures, but the principal temple, built by Ptolemy II., is the most noteworthy. It was dedicated to the goddess Isis and contains representations of the story of Osiris, including her birth, achievements, and death. This structure was 435 feet long and 135 feet broad, and still constitutes one of the best preserved ruins of Egypt. The island has several other temples founded by the sovereigns of the Ptolemy line and by the Caesars.

PHILIP (fī'líp), one of the twelve apostles

of Jesus, born in Bethsaida, the native city of Andrew and Peter. He was the fourth to be called, having been preceded as an apostle by Andrew, John, and Peter. It is recorded that he brought Nathanael to Christ, that he was present at the feeding of the 5,000 people with five loaves and two fishes, and that he was with the other apostles at the religious assembly following the resurrection. Some writers recount that he preached the gospel in Scythia and that he met his death at Hierapolis, in Syria. He is commemorated on Nov. 14 by the Greek Catholic and on May 1 by the Roman Catholic churches.

PHILIP, the Evangelist, mentioned in Acts vi., 5. He went to Samaria, where he preached the Gospel among the Samaritans, as may be seen in Acts viii., 4-5. This is the first instance of spreading the Christian faith outside the Jewish people, and later it is said of him that he baptized an Ethiopian eunuch, mentioned in Acts viii., 26-40. Afterward he made his home at Caesarea, where he was visited by Paul. He had four daughters who possessed the gift of prophecy. Some writers, especially the Fathers, confounded him with Philip the Apostle.

PHILIP, King, an Indian chief of the Wampanoags, younger son of Massasoit. He succeeded his brother, Alexander, as chief in 1662. At first he was friendly to the whites, but the encroachments of the colonists led him to resist the pressure tending to cause a decline of the Indian race. In 1675 he began the long contest called King Philip's War, in which he was joined by many of the New England tribes. In this war 600 colonists lost their lives and thirteen towns were completely destroyed. His tribe was almost annihilated. He was killed by an Indian when attacked by Capt. Benjamin Church near Mount Hope, R. I., on Aug. 12, 1676.

PHILIP, the name of five kings of Macedon, of whom Philip II. (q. v.) is the most important. Philip III. succeeded Alexander the Great in 323 B. C., having been elected as king by the army, and in 317 was defeated and put to death by Olympias. Philip IV. was a son of Cassander and reigned only a few months, in 296. Philip V. was the son of Demetrius II. He was born in 237 and succeeded to the throne in 220. He was the last but one of the Macedonian kings.

PHILIP II., King of Macedon, father of Alexander the Great, born in 382 B. C.; assassinated in 336 B. C. He was the son of Amyntas II., succeeded his brother, Perdiccas III., in 360, and by able and fearless diplomacy established himself securely upon the throne. His first work was to reorganize and discipline his army, and by skillful control of military and civil interests he soon made Macedon the most powerful state of the Grecian kingdom. Demosthenes endeavored to arouse all of Athens for the purpose of fortifying it against his growing power, and his celebrated speeches became

known as the "Philippics." While the Athenians were slow to be aroused to a sense of their danger, Philip was rapidly gaining strength by capturing the stronghold of Chalcidice. He concluded a peace with the Thracians, and made himself master of the cities of Phocia and the Pass of Thermopylae. Soon after he intervened between the warring forces of Phocia and Thebes, and in 340 B. C. became commander in chief of several Grecian states. When Athens and Thebes formed an alliance against him, he defeated their forces in a decisive battle at Chaeronea in 338 B. C., and thus became sovereign of all the Grecian states. He immediately began to plan for an invasion of Persia with the purpose of avenging the injuries done to Greece. Deputies were summoned from all the Hellenic states to plan an expedition with that end in view and Philip was elected commander in chief. His assassination occurred shortly after at the marriage of his daughter with Alexander of Epirus. Philip was a man of eloquence and force of character. He patronized learning, founded schools, and built highways and canals.

PHILIP I., King of France, son of Henry I., born in 1052; died July 29, 1108. In 1059 he became associated in the government with his father, but succeeded him in 1060 under the regency of his mother, and afterward reigned under that of Baldwin V., Count of Flanders. In his reign the Normans conquered England, in the year 1066. His son, Louis, became joint king in 1100 and succeeded him at his death as Louis VI.

PHILIP II., Augustus, King of France, son of Louis VII., born in August, 1165; died in Nantes, July 14, 1223. In 1179 he became joint king with his father and the following year succeeded to full sovereignty. He wedded the daughter of the Count of Hainault, a descendant of the Carolingians, and thus strengthened his position on the throne. The Jews were banished from his kingdom in the early part of his reign, and their property was confiscated. In 1189 he formed an alliance with Richard the Lionhearted, of England, by whose influence the third Crusade to the Holy Land was organized. Soon after returning from Palestine, in 1193, he invaded Normandy, Richard being at that time a prisoner in Germany, and after his release a war raged between England and France until 1199, when it was terminated through the kindly office of Pope Innocent III. After the death of Richard, King John and Prince Arthur were rival claimants for the English possessions in France and Philip supported the claims of the latter. When Arthur was assassinated, Philip annexed Anjou, Normandy, Touraine, and Maine to France, and his claim was firmly established by winning victories over the Germans under Emperor Otho and the English at Bouvines on Aug. 29, 1214. He is counted the most celebrated ruler of the Capet dynasty. The later

part of his life was devoted to civil and industrial reforms and the building of fortifications, canals, and schools. He strengthened the walls of Paris, paved its streets, and fortified the principal towns of France.

PHILIP III., King of France, born in 1245; died at Perpignan, Oct. 5, 1285. He was the son of Louis IX., whom he succeeded in 1270, while conducting a siege at Tunis. Soon after he signed a truce of ten years and returned to France, where he suppressed the revolt of Roger in 1272. His death occurred in the midst of a war with Peter of Aragon, who had invaded Sicily and massacred a large number of French.

PHILIP IV., surnamed *The Fair*, King of France, born at Fontainebleau in 1268; died there Nov. 29, 1314. He was the son of Philip III., married Joanna, Queen of Navarre, in 1284, and the following year succeeded his father as King of France. By his marriage Navarre, Brie, and Champagne were added to the royal domain, and early in his reign he curtailed the vassals in their influence. He was successful in a long war with Flanders, which resulted in annexing the Walloon territory and in adding Guienne, formerly possessed by the English. His reign became famous for his opposition to the freedom of the clergy from taxes, which brought on an extended contest with Pope Boniface VIII. Philip imprisoned the papal legate in 1300, publicly burned a bull issued by the Pope, and caused the prelates who sided with Boniface to have their property confiscated. When Boniface excommunicated him, he sent William de Nogaret with a military force to Rome, where the Pope was imprisoned for a short time.

After the death of Boniface VIII., Philip exercised his influence in electing Clement V. to the papal throne under the condition that Avignon should be the papal residence and the Knights Templar should be abandoned. In the period from 1306 to 1314 many hundreds of Templars were martyred and their property was confiscated. Philip as a sovereign exercised much energy in establishing royal power by suppressing feudalism. He likewise promoted extensive civil, industrial, and military reforms. His system of government caused a great rise in taxation, for which reason he resorted to confiscating the property of Jews, Templars, and political opponents, and at one period in his reign the currency became greatly debased. Many ordinances for the administration of the government were left by him, and he was the first sovereign to convene and consult the states-general.

PHILIP V., surnamed *The Tall*, King of France, born in 1294; died in January, 1322. He was the elder brother of Louis X., whom he succeeded in 1317. His reign was characterized by few noteworthy events.

PHILIP VI., of Valois, King of France, born in 1293; died near Chartres Aug. 22, 1350. He was the younger brother of Philip IV. and

succeeded Charles IV. in 1328, but his right to the throne was denied by Edward III. of England, grandson of Philip IV. Edward III. claimed the throne of France by his mother, who was the sister of Charles IV. Philip was supported by the people of France and the beginning of his reign was full of promise, but Edward III. declared war against him in 1337. This war was the beginning of a contest that waged for a period of 100 years and was finally terminated by the French victories under Joan of Arc. The first important event of the war was the destruction of the French fleet off Sluis in 1340. Normandy was captured in 1346 by Edward, who later marched upon Paris, but after the French defeat at Crécy a truce was concluded. Soon after France became embarrassed financially as a result of official extravagances, and the people succeeded in their demands to vest the exclusive power to tax in the assembly of the states. Philip was regarded unfriendly to learning, irrational in dealing with the Jews, and exorbitant in his exactions of revenue. He was succeeded by his son, John the Good.

PHILIP, the name of five kings of Spain; the two most important are treated in articles below. Philip I., King of Castile and Aragon, the son of Emperor Maximilian I., was born at Bruges on July 22, 1478; died there Sept. 25, 1506. Philip III., King of Spain, son of Philip II., was born at Madrid on April 14, 1578; succeeded his father on Sept. 13, 1598; and died at Madrid on March 31, 1621. Philip IV., King of Spain, son of Philip III., was born at Valladolid, April 8, 1605; succeeded to the throne on March 31, 1621; and died on Sept. 17, 1665.

PHILIP II., King of Spain, son of Emperor Charles V. and Isabella of Portugal, born at Valladolid, May 21, 1527; died in Madrid, Sept.



PHILIP II.

13, 1598. His mother died when he was twelve years old, but he was carefully educated for political duties under the direction of his father. He married Mary of Portugal in 1543, who died two years later, leaving a son, Don Carlos. He was

summoned to Brussels by his father in 1548, that he might become acquainted with the people and institutions over which he was to become ruler, and in 1554 married Queen Mary of England. The same year his father waived his claim to Naples and Sicily in favor of Philip,

and in 1555 gave him sovereignty of the Netherlands.

In 1556 the crown of Spain passed to him, and with it the colonial possessions of America, Asia, and Africa. Queen Mary died in 1558 and it was Philip's purpose to marry Elizabeth, who had succeeded to the throne of England, but, while that lady did not reject the proposal at once, she adopted a policy in religion that would have made such a union impossible. Changing his plans, Philip married Isabella of France in 1559, and soon after settled permanently in Spain. His religious policy was rigorous, and it was his design to become recognized as the head of the Catholic party in Europe, for which purpose he suppressed the free institutions that had long prospered in many parts of his vast dominion. The Netherlands revolted in 1566 and, after a successful conflict, established the Dutch Republic by uniting seven of the northern provinces. This contest was carried on under the leadership of William the Silent for many years, but Philip instigated the assassination of William in 1584. He was married a fourth time in 1570 to the Archduchess Anne of Austria.

The military forces of Philip II. conquered Portugal in 1580, when he annexed that country to his dominion and immediately began to build the Invincible Armada to further his plans in successfully overcoming the naval forces of England. The war began in 1596, but the Netherlands remained hostile, while the Turks engaged a portion of his forces. The only naval victory gained in the war was that of Lepanto, which was won over the Turks by Don John of Austria. His Armada was scattered by storms and eventually was totally defeated by the allied forces of England and the Netherlands. These disasters caused Spain to lose its proud position as a first-class naval power. In the meantime financial distresses accumulated and many Spanish colonies asserted their independence. Peace with France was finally concluded at Vervins in 1598. However, hostilities with England and the Netherlands continued and he died before the war terminated. Philip possessed considerable ability. He was the originator of many vast enterprises and was popular with the zealous, but his plans were seldom successful. It was his fixed policy to persecute vigorously his opponents and those differing from him religiously by employing the Inquisition. Historians generally unite in rating him as austere, cold, and bigoted. He was succeeded by his son, Philip III.

PHILIP V., King of Spain, first of the Bourbon kings, born in Versailles, France, Dec. 19, 1683; died in Madrid, July 9, 1746. He was the dauphin Louis, son of Louis XIV. of France, and in 1700 became King of Spain, succeeding to the throne by the will of Charles II., who died without direct heirs. In 1702 he married Mary Louisa and in the same year the Spanish Succession War was begun. This conflict was

caused by his rival claimant to the throne, Archduke Charles of Austria, who was supported by the allied forces of Austria, Holland, and England, while Spain, a portion of the Netherlands, and Naples sided with Philip. The war was finally terminated in 1713 by the Peace of Utrecht, by the terms of which Minorca and Gibraltar were ceded to England; Naples, Milan, and the Netherlands to Austria; and Sicily to Savoy, but the other Spanish possessions recognized him as king. His queen having died, he married Elizabeth Farnese, niece of the Duke of Parma, in 1714, who began immediately to exercise much influence in the government. It was her desire to expel the Hapsburgs from Italy, that her sons of a former marriage might secure possession, a wish which for many years disturbed the peace of Europe. In 1727 an alliance was formed by Spain, Holland, France, and England against Austria, whose emperor was then in possession of most of Italy, and in 1731 Spain recovered some of its Italian possessions. In 1736 the two sons of the Spanish queen secured the throne of the two Sicilies, but these advantages were lost soon after. Philip reigned 46 years. Many useful reforms were made in the period, including the establishment of schools, the improvement of the navy, and the founding of libraries. He was succeeded by his son, Ferdinand VI.

PHILIP THE BOLD, Duke of Burgundy, son of John the Good, born Jan. 15, 1342; died April 27, 1404. He was the last of the ducal house of Burgundy. After securing a military training, he displayed heroic courage at the Battle of Poitiers, in 1356, where he rescued the life of his father and earned the title of *The Bold*. Both he and his father were taken prisoners to England, but in 1360 he returned to France, where he was rewarded for distinguished services by an assignment of the duchy of Touraine, to which the duchy of Burgundy was added in 1363. He lost Touraine at the time Charles V. became King of France, but later obtained Flanders by marrying the heiress, Margaret. In 1372 the French army was placed under his command, with which he secured many of the English possessions, and when his nephew, Charles VI. of France, became insane, he was made regent. Philip not only displayed military genius, but he encouraged commerce, manufactures, and arts. A number of flourishing schools were established and fostered under his direction. His regency of France was alike wise and successful.

PHILIP THE GOOD, Duke of Burgundy, son of John the Fearless, grandson of Philip the Bold, born at Dijon, June 13, 1396; died at Bruges, July 15, 1467. His father was assassinated through the instigation of the daupin, afterward Charles VII., at the bridge of Montreuil, and he succeeded him as Duke of Burgundy in 1419. It was his desire to avenge the

death of his father, and accordingly he placed himself in an offensive and defensive alliance with Henry V. of England. This king recognized him as heir to the throne after the death of Charles VI. Later he was recognized as heir by the King of France and the states-general in the Treaty of Noyes, concluded in 1520, though this agreement was not in accord with the Salic law. However, the dauphin refused to recognize the treaty, and accordingly gathered a military force to assert his claims. He was defeated at Crevant in 1423 and again at Verneuil in 1424, but a dispute between Philip and the English caused the former to conclude a treaty with the French king in 1429. Afterward a second dispute arose between Philip and the English, when he was aided by the King of France in expelling the English from their possessions in France. Philip now became devoted to the encouragement of industrial and educational arts, for which purpose he devised a system of general taxation, and his reign was one of the most efficient and prosperous in Europe. Heavy taxation caused an insurrection in Ghent and Bruges in 1454, but it was suppressed by Philip with much ability. Burgundy was the most wealthy state of Europe during his reign, and his subjects generally mourned his death.

PHILIPPICS (fī-līp'pīks), a name originally applied to a series of celebrated orations spoken by the Greek orator, Demosthenes, against Philip, King of Macedon, father of Alexander the Great. The number of orations is usually given as three. Their special purport was to arouse the Athenians for defensive organization against the growing power of Macedon. The name was afterward applied to fourteen orations delivered by Cicero against the dangerous and malicious designs of Mark Antony, and since it has come to signify any severe written or oral invective.

PHILIPPINES (fīl'īp-īnz), or **Philippine Islands**, a group of islands in the Malay Archipelago, situated southeast of Asia, including 3,141 islands and islets. The total area is about 115,026 square miles. Many of the islands are small and comparatively worthless, but as a whole the group possesses remarkable richness in natural resources, and occupies a position of value in trade. The principal islands are Mindanao, Luzón, Palawan, Sámar, Panay, Mindoro, Leyte, Negros, Cebú, Masbate, Bohol, and Romblón. Twenty-one other islands are of fair size, ranging from 100 to 250 square miles.

DESCRIPTION. The islands are of volcanic origin and are a part of the vast oceanic plateau which is partly elevated above the surface of the sea. They are surrounded by comparatively shallow waters, which exceed a depth of 200 feet only in a few places. The surface is diversified by mountains, thus making a large part of the area not inhabitable and tending to centralize the inhabitants in the more fertile parts. In general the ranges extend from south

to north, showing the outlines of a continuous mountain system that formerly towered at great elevation above the sea. The highest peaks approximate 10,000 feet, but Apo, in Mindanao, the culminating summit, is 10,312 feet high. Between the mountains are narrow plains, which broaden somewhat near the coast. Most of the highlands are near the interior of the islands and slope toward the coast, but Leyte has no elevated mountains. Only a few of the volcanoes are active at present, though twenty have had eruptions within the historical period, and fully fifty have well-marked volcanic



characteristics. The coast lines are generally irregular and afford excellent harbors. Earthquakes are frequent and in many cases destructive.

The rivers are short and rapid. Mindanao, one of the largest islands, has two rivers of considerable length, the Agusan and the Pulanqui. The former flows north into the Surigo Sea, while the latter has a course toward the southwest into Lake Liguasan, whence it flows toward the northwest into Illana Bay. The Cagayan drains the northern part of Luzon. In the southern part of that island is the Pásig, which unites Laguna de Bay with Manila Bay. This stream is the most important for commercial enterprise, affording transportation facilities from Manila, on Manila Bay, to Pásig, Santa Cruz, and other ports on Laguna de Bay. A

number of the streams are used for irrigating purposes in regions where the rainfall is insufficient. Luzon has two lakes of considerable size, Laguna de Bay and Bonbom, or Taal, both being fed by numerous springs and streams. Mindanao has a number of lakes, including Lanao, Liguasan, and Buluan. Mindoro, Leyte, and Samar have many small rivers, but the lakes are not important.

The Philippines, being located within the tropics, have a climate naturally favorable to a vegetable growth. It is diversified in the different islands, owing partly to variations in altitude and area, and partly to the predominating influence of prevailing winds. Three seasons mark the year more or less distinctly. These include the temperate and wet from June to October, the temperate and dry from November to February, and the hot and dry from March to May. In some sections the rainfall is constant and heavy in July and August, reaching about 114 inches in some localities. Along the eastern coast the precipitation is not excessive, being shut off to some extent by the mountains. The temperature ranges from 61° to 97° during the year, though in July and August it remains almost stationary between 79° and 85°. Terrific storms sweep across the islands at intervals. They are cyclones of wind and rain, known as *typhoons*, but occur most frequently in the northern section, where life and property are frequently endangered. The climate is generally healthful to those acclimated and in some localities it is highly favorable to Europeans, though other parts are subject to malaria. Smallpox, leprosy, tuberculosis, and venereal and skin diseases are the most prevalent ailments, but there is considerable percentage affections of typhoid fever, diarrhoea, and dysentery.

FLORA AND FAUNA. The islands are rich in vegetable life, which assumes varied and distinctive forms. Valuable forest trees abound in different sections of the archipelago, including the ebony, cedar, ironwood, sapan wood, banyan, bamboo, and banana. Some of the trees are so hard that they are cut with difficulty, and this class of timber is exceptionally valuable for furniture and shipbuilding. Some localities are interlaced and garlanded by many species of shrubs and vines that are common in tropical regions. Blossoms and fruit are found hanging together on the trees in the cultivated fields and the yield of crops of this kind is in constant succession. Hemp is the best known product of the Philippines and the name manila is generally applied to the commodities made from it, such as twine, rope, and paper.

Few native mammals are found. The carabao, or water buffalo, is the most important animal, and is valued for its flesh and as a beast of draught and of burden. The milk of the female is used as food and for making a kind of butter, known as *ghee*. It is thought that the

humped variety of cattle is native. Other native animals include crocodiles, civet cats, monkeys, and reptiles. Many species of birds of song and plumage abound, and huge spiders and tarantulas are very common. Insect life is well represented in all the islands. Among the birds are the snipe, jungle fowl, curlew, pigeon, hornbill, and humming bird. Oysters, crabs, and fishes are well represented.

MINING. The islands have an abundance of mineral wealth, much of which has been known for centuries, although the developments are only of comparatively recent date. Coal is

species of plants have been classified by botanists, showing that the flora is very extensive. Manila hemp, the fruit of a wild plantain, is considered the most valuable of the native plants. Luzón has the largest area of tilled land, while Masbate possesses the most extensive interests in live stock. Hemp is the leading product, the annual yield having a value of about \$25,500,000. It is followed by the yield of sugar, which is obtained chiefly from sugar cane. Tobacco has a high rank, both in quality and yield, and in the volume grown annually the islands are exceeded only by Cuba. Other prod-

ucts include coffee, rice, cotton, chocolate, coconut, corn, and cacao. The

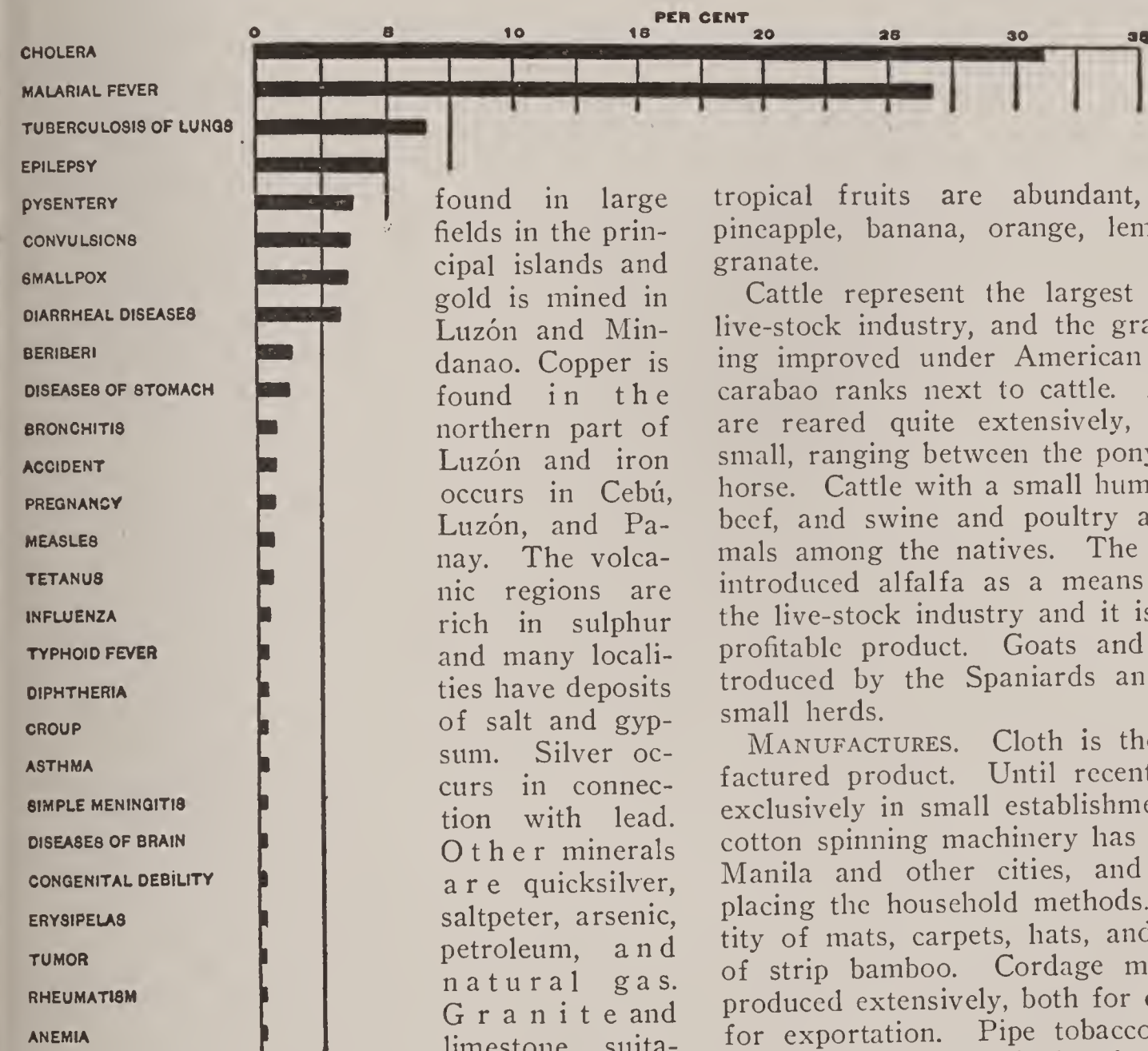


Diagram to show the causes of deaths in the Philippines.

abundant. Coal is at present the most important mineral product, being used extensively as fuel on locomotives and steamboats, and the quantity produced consists largely of carbonized lignite. The output of the mines is greatly limited for the want of transportation facilities.

AGRICULTURE. The leading industry is agriculture, but the methods of farming are crude and primitive. Farming implements were very inferior until the islands became a possession of the United States, when farm machinery of a superior grade was introduced for the first time. Agriculture is confined almost entirely to the region elevated less than 700 feet above the sea. Nearly all the cultivated plants common in Southeastern Asia thrive. About 5,000 native

found in large fields in the principal islands and gold is mined in Luzón and Mindanao. Copper is found in the northern part of Luzón and iron occurs in Cebú, Luzón, and Panay. The volcanic regions are rich in sulphur and many localities have deposits of salt and gypsum. Silver occurs in connection with lead. Other minerals are quicksilver, saltpeter, arsenic, petroleum, and natural gas. Granite and limestone suitable for building purposes are

tropical fruits are abundant, especially the pineapple, banana, orange, lemon, and pomegranate.

Cattle represent the largest interests in the live-stock industry, and the grades are becoming improved under American influence. The carabao ranks next to cattle. Although horses are reared quite extensively, the grades are small, ranging between the pony and the saddle horse. Cattle with a small hump are grown for beef, and swine and poultry are favorite animals among the natives. The government has introduced alfalfa as a means of encouraging the live-stock industry and it is found a highly profitable product. Goats and sheep were introduced by the Spaniards and are grown in small herds.

MANUFACTURES. Cloth is the leading manufactured product. Until recently it was made exclusively in small establishments, but modern cotton spinning machinery has been installed in Manila and other cities, and is rapidly displacing the household methods. A large quantity of mats, carpets, hats, and rugs are made of strip bamboo. Cordage made of hemp is produced extensively, both for domestic use and for exportation. Pipe tobacco and cigars are manufactured extensively, for which purpose modern machinery has been introduced. Other manufactures include salt, confectionery, pottery, saddlery, brick, and furniture. Lumber is exported in considerable quantities. A large number of small vessels are made for coastwise transportation.

TRANSPORTATION AND COMMERCE. In 1916 the islands had about 350 miles of railways in operation, but it is estimated that less than 1,000 miles are required to properly facilitate industrial developments. The most important line is operated in the western part of Luzón, extending from Manila to Lingayén. The requirement is to operate the short lines from the coast to the interior rather than to extend railways lengthwise of the larger islands, since the transportation problem involves moving the prod-

ucts from the interior to the coasts. Traffic is promoted mainly by steamers, which carry a large coastwise trade. Highways of a superior grade have been constructed, but only a few sections are equipped with roads of a high grade. Much of the interior trade is carried on carts drawn by carabaos.

The exports somewhat exceed the imports and the foreign trade is largely with Great Britain, Germany, China, Spain, and the United States. Manila hemp is the most important export and it is followed in order by sugar, tobacco, lumber, and fruits. The imports include cotton textiles, flour, glass, liquors, and machinery. The three leading ports are Manila, Cebú, and Iloilo, but customhouses are maintained in three other ports, those of Apparri, Jolo, and Zamboanga. The telephone and telegraph are used extensively and an adequate postal service is maintained by the government.

GOVERNMENT. The government is administered under American control. Executive authority is exercised by the Governor General, Vice Governor General, and other officers, such as secretary of the interior, secretary of finance, secretary of justice, etc. Since 1916 the legislative authority has been vested in the Philippine legislature, composed of two branches, one the senate and the other the house of representatives. The senate consists of 24 senators and the house of representatives of 90 members. The legislature created under this law opened its first session on Oct. 16, 1916, and on its being organized the former Philippine commission ceased to exist and the members thereof vacated their offices.

The legislative franchise is restricted to those who held public office under the Spanish government, who speak, read, and write English or Spanish, or who have property valued at \$250.00 or pay no less than \$15.00 in taxes. Annual sessions are held by the Legislature. Judicial authority is vested in the supreme court, the courts of first instance, and the municipal courts, but all important causes are subject to review by the Supreme Court of the United States.

For the purpose of localizing the government, there have been established provinces, and these are subdivided into *pueblos*, or townships. The executive officers of the Province are a governor, district engineer, treasurer, superintendent of schools, and an elective official, but the administration is largely under the provincial board, which consists of the governor, treasurer, and elective official. Both the governor and the elective official are elected by the provincial assembly, and the other officials are either appointed or are elected by a direct vote. Government in the townships is administered as under the municipalities, which form the unit of local government.

EDUCATION. When the Spaniards occupied the Philippine Islands, in 1565, they found the

natives not wholly illiterate. The ancestors of the present Christian population wrote their dialects in syllabaries of Hindu origin, while the Mohammedan peoples of Mindanao and Sulu were beginning to use Arabic characters, in which their literature is still preserved. The early Spanish missionaries taught the people to use the Roman alphabet in place of the Hindu syllabaries. Ability to read and write the native dialect in this way has been widely spread. The census of 1903 found over a million people able to read and write in a native dialect. Unfortunately the census did not distinguish the Filipinos able to read and write Spanish. This knowledge is confined to a comparatively small class of Filipinos, although successive royal decrees, beginning at an early date, ordered that instruction should be given in the Spanish language by the *curas*, or *sacristans*, of the missions. About 1863 the Spanish government made the first public provision for primary instruction. Town schools for both sexes were decreed and provision was made for training Filipino teachers. This work succeeded steadily, though slowly, until the close of the Spanish rule, when nearly every Philippine town had at least one primary school for each sex. The instruction was sometimes in Spanish, but more often in the native dialect.

Since the American occupation, in 1898, a comparative comprehensive public school system has been organized; public primary schools for boys and girls are conducted in every municipality and in a large proportion of the 13,000 *barrios*, or villages. All instruction, even in primary schools, is in the English language. The teaching is done by Filipino teachers, there being over 6,500 of them who have received their training since the American occupation. This primary work is supervised by about 400 American teachers. The primary course is brief, covering only four years, and is followed by a three years' intermediate course. Forty high schools are maintained, one in the city of Manila and one in each province, as well as the following insular schools in the city of Manila: the Philippine Normal School, the Philippine School of Arts and Trades, the Philippine School of Commerce, and the Philippine School for the Deaf and Blind.

The administration of the entire public school system is closely centralized, general authority being vested in the Director of the Bureau of Education, whose office is in the city of Manila. Each Province has a school superintendent, appointed by and subject to the Director of Education. These public schools are provided for by three classes of revenue: an insular appropriation for the Bureau of Education, appropriations by provincial governments for high school, and municipal school funds, supplied largely by land tax. The total school fund from these sources for the fiscal year ending June 30, 1908, amounted to \$3,047,930.20. Public school

pupils for the same year numbered 496,676, of whom 1,643 were secondary pupils, 17,780 intermediate, and 467,203 primary.

Large attention is given to industrial training. In primary schools pupils receive instruction in native arts and industries, and in intermediate schools they are instructed in tool work, mechanical drawing, agriculture, hygiene, and housekeeping. The Philippine Medical School, established by the Federal government, was opened in 1907. It has a fine building and a highly trained corps of professors. The Philippine Legislature in a recent session provided for the incorporation of the University of the Philippines.

Under the Spanish régime higher, or superior, instruction was in private hands, though in certain cases was aided by the government. Schools were established by the sons of Spanish colonists within the first decades after the conquest. In 1601 the Jesuits established in Manila the College of San José. The Dominican Order founded the College of Santo Tomas in 1619. This subsequently became the Royal and Pontifical University of Saint Thomas Aquinas. Provision was early made for the training of Jesuit priests, who were both sons of Spanish colonists and Filipinos. In the last century of the Spanish rule there were seminaries in each Episcopal diocese. Two important institutions were established by the Jesuits after their return to the islands, the *Normal School* and the *Ateneo*. Although the plan of public instruction is a comprehensive one and has rapidly developed, private instruction still plays a large part in the education of the islands.

INHABITANTS. The native inhabitants appear to have descended from a number of races, since they include brown, black, and yellow classes of people. Fully nine-tenths of the population belong to the brown race, but they are mixed more or less with other peoples. They include principally the Tagal, Visaya, Ilocano, Vicol, Pampango, Cebuano, and Pangasinan branches. The native blacks belong to the Negro type, commonly called *Acta*, and are small in stature. They are thought to be the aborigines of the islands, while the other races are thought to have immigrated at an early period of the Christian era. Another class known as Moros is thought to have invaded the archipelago about the 15th century, shortly before the Spanish conquest. The yellow peoples are of a Mongoloid type and are a mixture of the Chinese, Siamese, and Japanese. A small per cent. of the people belong to the red or American race, having been taken there by the Spanish in the 17th century, when vessels carrying the flag of Spain sailed regularly between Manila and Acapulco, Mexico.

About thirty distinct dialects are spoken in the archipelago, but the number is much larger if all of the local variations are taken into account. Some of the languages are primitive

and crude, while others show a high degree of precision and culture. At present the tendency is to unify and develop the leading languages at the expense of the others, and English is taken up readily by the younger classes. The leading dialects include Visaya, Tagalog, Cagayan, Ilocanos, Vico, Pagasinan, Pampango, and Igorrote. Roman Catholicism was introduced by the Spaniards and is the predominating religion, but the leading Protestant denominations have secured a large following through effective missionary work. Many of the natives in the Sulu Islands are Mohammedans, and the Buddhist faith is representative in some sections. Some of the wild tribes in the south, especially the Moros, conduct a form of Pagan worship.

Manila, in the southwestern part of Luzón, is the capital and largest city. Other cities of importance include Albay, Batangas, Bauan, Lipa, Taal, Cebú, Balayan, Laoag, Iloilo, and Zamboanga. Luzón is the most populous island, but Cebú has the largest number of inhabitants to the square mile. In 1919 the total population was 8,935,426.

HISTORY. The Philippines were discovered in 1521 by Magellan, who visited many parts of Mindanao and in the same year lost his life in a war with the King of Cebú. Spain immediately began to promote colonization of the islands, but a permanent settlement was not founded until 1565, when a colony was planted on the island of Cebú. The islands were officially annexed by Spain in 1569, but all of the islands were not conquered until the early part of the 17th century. Manila was founded in 1571 and was made the seat of government. Christian missions were established soon after in a number of the islands. The Chinese invaded the archipelago in 1602 and almost succeeded in destroying Spanish influence, which was likewise threatened by the Dutch. During the 18th century the islands remained in the hands of the Spanish, except that they were captured by the British during the Seven Years' War, but they were restored to Spain in 1763 by the Treaty of Paris. The cultivation of tobacco as a government monopoly was introduced in 1788, with the view of making the colony self-supporting, and by this means the extensive resources became known.

Spain remained in undisputed possession of the islands, except that a number of attempts to establish a native independent government were made, until the beginning of the Spanish-American War, in 1898. The last armed resistance against the Spanish had been organized in 1906, under the direction of Emilio Aguinaldo and other native leaders. This insurrection had been subdued after a desultory war of nearly two years and Spain was to pay the leading malcontents the sum of \$800,000, but only half of this sum was ever paid. This caused the insurrection to break out again in April, 1908, and Aguinaldo held a conference with Consul-Gen.

eral Pratt, the United States representative at Singapore, and it was agreed that he should coöperate with Commodore Dewey, who was in command of a fleet. Aguinaldo received a supply of arms from Commodore Dewey for the insurgents, who promptly rallied to the support of their leader. The Spanish fleet was destroyed at Manila on Aug. 13, 1898, and many points inland were occupied. The Treaty of Paris ceded the islands to the United States, but Spain received a cash payment of \$20,000,000.

A dispute between Aguinaldo and other leaders of the insurrection against Spain now arose with the American authorities on account of a misunderstanding. The Filipinos had organized a government and adopted a provisional constitution and Aguinaldo appealed to the nations for the recognition of the independence of the Philippines. A revolt, known as the Filipino Insurrection, against American authority, began in February, 1899, when hostilities broke out at Manila. This was followed by an intimation that the United States would annex the islands, which policy was characterized by many Americans as the beginning of imperialism and contrary to the spirit of the American republic. Nearly two years were consumed in subduing the opposition, hence much expense and bloodshed were involved. The prospects of acquiring territory with extensive natural resources prompted the Americans, rather than a conciliatory policy like that pursued in Cuba.

President McKinley sent a commission to the islands in January, 1899, for the purpose of investigating the conditions and endeavoring to induce the natives to accept American rule. This commission issued a proclamation as a means to explain the intentions of the government and proceeded to organize a party favorable to the Americans. Little progress was made by the American army until the latter part of 1899, when the native army was driven to the mountains, where a guerilla warfare was conducted for some time. Aguinaldo was captured in March, 1901, and the insurrection was ended. The government throughout the war was military, but large districts were soon pacified and civil government was established. The cost of the war to the United States was about \$175,000,000. William H. Taft was at the head of the government from 1900 until 1904, when he was succeeded by Gen. Luke E. Wright. In 1906 Henry C. Ide was made Governor and he was succeeded soon after by Gen. James F. Smith.

The first general election was held in 1907, when 80 members of the legislature were chosen, the total vote being 87,803. William H. Taft, then United States Secretary of War, personally opened the first session. The trade with the United States, up to and including 1917, increased materially since the American occupation was consummated.

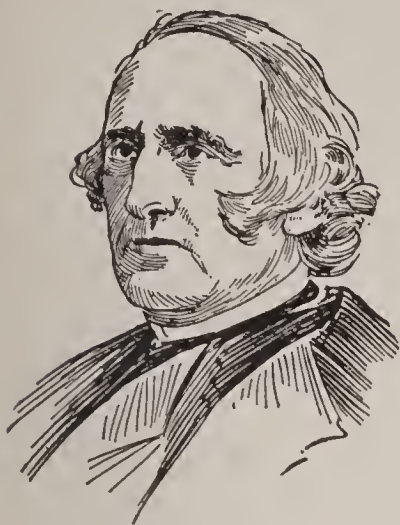
PHILIPPPOPOLIS (fĭl-ĭp-pŏp'ŏ-lĭs), a city

of Bulgaria, capital of Eastern Rumelia, on the Maritza River, eighty miles southeast of Sofia. It is on the railroad between Sofia and Constantinople, and is connected by several steamboat lines through the Maritza River with the Mediterranean. The surrounding country produces fruits, cereals, and vegetables. Many of the buildings are one-storied, but it has some fine structures, such as the public library, the Greek cathedral, and many Christian and Mohammedan places of worship. It has a large trade in grain, attar of roses, rice, hides and merchandise. Among the manufactures are wine, earthenware, clothing, cigars, and machinery. A large per cent. of the inhabitants are Bulgarians, but there are many Jews, Armenians, Greeks, Turks, and Gypsies. It belonged to Turkey previous to 1878, when it was occupied by the Russians, and in 1885 Eastern Rumelia became a part of Bulgaria. Since then it has been improved by the introduction of modern utilities. Population, 1915, 45,707.

PHILISTINES (fĭ-lĭs'tĭnz), the name of a people formerly resident in the lowlands of Palestine, on the Mediterranean coast, occupying the region from near Joppa to the Egyptian desert south of Gazo. They are mentioned in the Bible as coming in conflict with the Israelites in the age of the Judges, and are spoken of as a warlike colony at the time of the exodus. It was largely on their account that Moses selected a circuitous route in passing from Egypt to Canaan, the people fearing to encounter them in battle. Their territory consisted of five principal cities or provinces, which were governed by princes, and included Ashdod, Askelon, Ekron, Gath, and Gaza. In the time of Eli they overwhelmed the Israelites, when they captured the ark. King Saul came in conflict with them and slew himself in the Battle of Mount Gilboa. David and Solomon battled against them and the latter finally annexed their territory, but later they were emboldened by the internal strife of Judah, when they again rebelled against Israelitic supremacy.

In the reign of Ahaz the Philistines formed an alliance with the Syrians and Assyrians, to harrass the Israelites, but their whole country was again subjected by Hezekiah. The writings of the prophets make it certain that they were a menace to the Jews, but it is reasonable to assume that at different periods intermarriages and social connections between the two nations were of common occurrence. They appear to have been a civilized people, were devoted to agriculture and commerce, and possessed more than ordinary skill in warfare. Residing near the Mediterranean, they developed a considerable trade in manufactures. Their name is from a Semitic root meaning "to wander." The Septuagint calls them aliens. In later times their country became merged into Palestine and all traces of their former dialect were lost.

PHILLIPS (fĭl'ĭps), **Wendell**, orator and abolitionist, born in Boston, Mass., Nov. 29, 1811, died there Feb. 2, 1884. He descended



WENDELL PHILLIPS.

from a wealthy family, took a high school course in Boston, and in 1831 graduated from Harvard University, where he was a classmate of Charles Sumner and J. L. Motley. Both at school and college he was noted for studious habits and superior intellect, while his personal character was exemplary. After graduat-

ing at Harvard, he entered the Cambridge Law School, where he studied under Justice Story, and in 1834 was admitted to the bar. Soon after he entered the law office of Thomas Hopkinson, in Lowell, where he met Benjamin F. Butler, and in 1835 began the practice of law in Boston. In 1836 he married Ann Terry Greene, who survived him more than a year.

Phillips was successful in his practice from the first, his success being due to his extraordinary talent and fine oratorical ability. In 1837 he witnessed a mob making an assault on William Lloyd Garrison, who had spoken in Boston in favor of the emancipation of the slaves, and was so forcibly impressed that he entered upon a careful study of the slavery question. Soon after he was denounced as an abolitionist and began to arouse public sentiment by advancing unanswerable arguments against slavery, which persuaded a large number of people to join in the movement for the liberation of the slaves. His first great address on this subject was delivered at Faneuil Hall in 1837, when he denounced the murder of E. P. Lovejoy at Alton, Ill., by sympathizers of the slaveholders. This course caused many of his clients to abandon him and his practice was almost ruined. However, he received an inheritance from the estate of his parents, by which he was enabled to devote himself to the promotion of the antislavery cause and to lecture on other subjects. His principal lecture, entitled "The Lost Arts," was delivered more than 2,000 times and brought him fully \$150,000.

Both Phillips and Garrison favored the political equality of women, a position that caused the former to withdraw from the World's Anti-Slavery Convention in London, which had refused the admission of women as delegates, and he joined O'Connell in advocating the emancipation of Catholics in Ireland. He opposed the annexation of Texas, the Mexican War, and the Compromise of 1850, and favored the separation of the free and slave states until Fort Sumter was fired upon, when he began to advocate the destruction of slavery by the defeat of the Con-

federacy. His hopes were fully realized when President Lincoln issued the Emancipation Proclamation, but he continued an aggressive campaign in favor of the movements that finally led to a triumph of the Union cause. After the war he became a leader of the Labor party and was one of the organizers of the Greenback party. On Dec. 26, 1883, he delivered an address at the unveiling of a statue of Harriet Martineau in Boston, which was his last public oration. Phillips was remarkable as an orator in that he fired his audience to the height of enthusiasm and the most intense interest. In speaking he was always calm and apparently unaffected, while his flow of language was easy and natural.

PHILLIPSBURG (fĭl'ĭps-bŭrg), a city of New Jersey, in Warren County, on the Delaware River, fifty miles northwest of Trenton, opposite Easton, Pa. It is on the Central of New Jersey, the Lackawanna, and the Pennsylvania railroads. The features include the public library, the townhall, the high school, and several fine churches. Among the manufactures are silk goods, ironware, clothing, machinery, locomotives, and farming implements. The surrounding country is agricultural and dairying and contains productive deposits of limestone and iron ore. It was settled in 1749 and incorporated in 1861. Population, 1920, 16,923.

PHILOCTETES (fĭl-ŏk-tē'tēz), a famous archer of the Greeks, who is mentioned in their legends as the friend and armor-bearer of Hercules. The latter instructed him in archery and gave him the bow and poisoned arrows so noted in the Trojan War. Philoctetes was aggrieved by Paris carrying Helen to Troy, since he had been a suitor for her hand, but when the Trojan War brought on the voyage of the Grecian forces he was wounded in the foot by the bite of a poisonous snake, though some thought that the wound resulted from one of his own arrows. The ulcerated wound became so disagreeable that he was left on the island of Lemnos, where he remained until the oracle declared that Troy should not be taken without his assistance. Accordingly Ulysses and Diomedes were sent to induce Philoctetes to return to the Grecian camp, where his wounds were healed by the skillful Machaon, son of Aesculapius. He soon became reconciled with Agamemnon and in an engagement, which took place immediately after, he mortally wounded Paris. For this act he was given credit for material aid in capturing Troy. On his return from Troy he was wrecked on the coast of Italy, where he founded Crimissa and Petelia.

PHILO JUDAEUS, distinguished Jewish philosopher, born in Alexandria, Egypt, about 15 B. C. He descended from a wealthy family and received a liberal education in his native city, where he appears to have spent his whole life. His natural ability was linked with an extraordinary desire to secure educational advancement, and he devoted constant attention to

the mastery of all the studies contained in the course of the great university founded by the Greeks in Alexandria. His writings indicate that he possessed a wide range of knowledge in philosophy and metaphysics. He contributed many valuable additions to history, astronomy, music, geography, mathematics, and other branches of learning. It appears that he made a visit to Rome in 40 A. D. for the purpose of persuading Emperor Caius to refrain from requiring the Jews to give up their religious views, and on this mission he was accompanied by a Jewish embassy.

Philo studied the writings of Homer, Plato, and other Grecian writers, but he continued firm in the belief that the revelations through Moses are the source of true religion and that the philosophy of the Jews embodies the highest wisdom. Several of the fathers of the church record that he met the Apostle Peter on a second mission to Rome in the time of Emperor Claudius, though some think this is extremely doubtful. His writings indicate that he mastered the literature of his own people from translations, and that the Septuagint translation of the Bible was the only one with which he was acquainted. Writers have given us little information regarding the life of Philo, but the numerous writings from his pen that are extant enable us to become acquainted with his views of the universe and of life. By them it is possible to estimate his scientific and religious aim and to assign him the station to which he is entitled in the history of the growth and development of thought.

He is not only the most important Hellenic Jewish writer, but we learn from his writings the views held by this particular class of Jews, and what their aim was in the teaching of secular and religious themes. A student of philosophy and Mosaic law, he gave both a high position as branches to be studied, and it was his inclination to direct his thoughts toward harmonizing the two. In his discourse on religion he points to God as the source of all good and perfection and conceives him as being far superior to any of His creatures, His perfection assuming such magnitude that it cannot be realized. He not only holds to the view that there is a future life for the blessed, but expresses a belief in the punishment of those who do not escape the temptations of sin. Many works are assigned to him, but some are thought to be spurious.

PHILOLOGY (fī-lōl'ō-gŷ), the branch of study that treats of human language. It traces the origin, development, and general structure of the different languages and involves all that speech discloses as to the nature and history of man. The study of language in connection with history and literature is commonly called *classical philology*, while the scientific investigation of the laws and principles of a language or a group of languages, as involving the comparison

of different languages with each other, is usually called *comparative philology*. It is not the aim of the philologist to study languages so as to be able to read and speak them, but he examines them with scrutinizing care as if they had a different source, and later brings the points of likeness and dissimilarity into convenient forms, that they may be classified and grouped. Languages have a well-defined law of growth and life, changing to meet the needs of individuals in communicating with each other.

Every discovery and invention, as well as every change in society, exercises a modifying influence upon the language of a people, hence the languages are continually undergoing changes by certain words becoming *obsolete*, while newer terms spring into common use. It is possible for man to communicate without uttering sound, which is now the case with those who are deaf and dumb. It is likewise possible that written characters may be employed to convey knowledge to others even without employing vocal sounds. The latter method was utilized in placing hieroglyphics and written symbols on monuments and other durable forms for the purpose of conveying intelligence to future generations, though it is scarcely possible that a race ever existed which employed written characters exclusively to convey ideas among the living, but instead practically all employed both vocal sounds and written characters.

It is probable that in the beginning language originated largely from sounds heard in nature. This conception of the building of a language necessarily limits the early stage to a very small sphere, and as society developed and institutions were founded it grew into more or less complexity, reaching its highest stage in the highest civilizations. As a science, philology dates from a comparatively recent time. The Greeks were the only ancient people who gave the origin of language any consideration, but their development of the science was necessarily limited since they were acquainted with only their own language. The first advance in philological study was brought about by bringing Sanskrit to the notice of European scholars, who observed a peculiar similarity between it and Greek. Franz Bopp (1791-1867), a German scholar, is the undoubted founder of study in the Aryan languages and he was succeeded by such eminent writers as the Grimm Brothers, Schlegel, and Wilhelm von Humboldt. It will thus be seen that the science dates practically from the early part of the last century. Since then many able writers have added a vast fund of information to the literature of the science.

Different classifications of languages are adopted by various writers, but in the main they usually agree upon three classes, the monosyllabic, the agglutinate, and the inflectional. The *monosyllabic class* embraces a group of languages whose words are composed of one syllable, of which the Chinese is the typical lan-

guage, and to it are allied the languages spoken by the Tibetans, Siamese, Anamese, and Burmese. *Agglutinate languages* include those in which the word elements are so united as to retain their separate identity as modificatory syllables and usually, but not frequently in some tongues, a part of their significative power as independent words. The words are not inflected when filling different offices and suffixes are not added, but entire words are used in combinations, as steamboat, mankind, and locksmith. The Turanian languages are agglutinate. To this class likewise belong all the languages of Europe and Asia that are not included with the Aryan, the Semitic, and the cognate dialects of the Chinese.

The *inflectional languages* belong to two distinct families, the Semitic and the Indo-Germanic or Aryan. They are peculiar in that words are joined together and made into sentences, not by means of a set of small secondary and auxiliary words, but by means of changes made in the main words themselves. Nouns, pronouns, and adjectives are inflected by declension, verbs by conjugation, and adjectives and adverbs by comparison. Fast, faster, fastest; love, loved, loving; and man, men, are familiar examples of inflection. The Semitic and Aryan groups of languages are so different in their grammatical framework that it has been impossible for science to establish a relationship between the different groups, though it is impossible to affirm or deny that both came from a common source. The Semitic languages include the Hebrew, Arabic, Chaldee, Syriac, Aramaic, etc. Max-Müller divided the Indo-Germanic languages into the following eight classes: Indian, Iranian, Greek, Italic, Celtic, Illyric, Slavonian, and Teutonic. See **Languages**.

PHILOMELA (fīl-ō-mē'là), in mythology, a daughter of Pandion, King of Athens, and sister of Procne. She was loved by Tereus, who cut out her tongue that she might not expose the wrongs he did to her, but she wove the story of her wrongs into a mantle and sent it to Procne. Later the two sisters killed Itys, the son of Procne by Tereus, and served his flesh to his father for dinner. Tereus discovered the crime and pursued the sisters, but the gods turned them into birds. It is related that Tereus was changed into a hoopoe, while Procne became a swallow and Philomela a nightingale.

PHILOPOEMEN (fīl-ō-pē'mēn), eminent patriot of ancient Greece, born at Megalopolis in 252; died in 183 B. c. He descended from a prominent family of Arcadia, but lost his father at an early age, and was carefully educated under the direction of a wealthy citizen named Cleander. His first important military success was achieved in 222 B. c., when he took an active part against the King of Sparta. In 208 B. c. he advanced to the highest dignity in the mili-

tary service of Greece by being elected commander in chief of the Achaean League, and was reelected to the same place seven times. In that capacity he improved the discipline and armor of the Achaean soldiery and defeated Machanidas of Sparta and his successor, Nabis. Subsequently he carried on a military campaign in Crete, but was recalled to organize against the rise of Roman power, which began to be an important factor in Eastern Europe against the Greeks. In 183 B. c. the Messenians broke their connection with the league, and he immediately headed a body of cavalry to quell the revolt, but was taken prisoner because of a defeat by overwhelming numbers, and, after being carried to Messene, he was compelled to drink a cup of poison.

PHILOSOPHY (fīl-ōs'ō-fy), a term which may be defined as embracing the general principles that furnish the rational explanation of anything, or as the scientific system that embraces the general principles or laws under which all the subordinate facts relating to some subject are explained. The name is said to have been suggested by Pythagoras, who, when complimented on his wisdom, said that he was not wise, but a lover of wisdom, the deity alone being wise. Thus philosophy means the love of wisdom, being derived from the Greek *philosophia*=love of wisdom. The term came into general use in the time of Socrates, who first termed any seeker after truth a *philosopher*, meaning a lover of wisdom. Thus, the subject of philosophy included all investigations concerning both mind and matter. It may be said that the history of philosophy has its beginning with the Greeks, since the philosophical investigations of the East only served to induce study. After years of investigation, Oriental notions were systematized and incorporated with the accepted opinions of Greece. However, study was largely speculative, since the philosopher made up a theory and then endeavored to accommodate facts to it.

The whole period of Grecian philosophy extends from the time of Thales of Miletus, about 600 years B. c., to about 500 A. d. Among the Greek philosophers are the most eminent thinkers and students of antiquity, who not only gave intellectual impetus to Greece and Rome, but carried their learning to Alexandria and promulgated theories from which modern scholars have drawn inspiration and profit. The two schools of philosophy before the time of Socrates are known as the *Ionian* and the *Eleatic*. The principal representatives of the former include Thales, Anaximander, Anaximenes, and Pythagoras, and of the latter, Parmenides, Xenophanes, and Zeno. Socrates introduced a religious spirit with scientific and scrutinizing methods and opposed the teachings of the so-called *Sophists*. Plato was a disciple of Socrates, but became identified with a system of idealism. Plato reasoned from the general to

the particular under a system of deduction, and later Aristotle introduced inductive reasoning by proceeding from the particular to the general.

Stoicism, Epicureanism, and Skepticism were the three prominent schools of philosophy of later Greece. Rome borrowed largely from Greece and may be said to have had no distinct schools, aside from *Eclecticism*, of which Cicero is the most noted representative. *Neo-Platonism* was the last phase of ancient philosophy. During the Middle Ages Scholasticism represented a form of speculative philosophy, by which it was sought to harmonize philosophy with Christianity. The Scholastics were noted particularly because of their placing especial stress upon the importance of a thorough study of Greek and other ancient languages at the expense of the newer and more practical.

The history of modern philosophy begins with the early part of the 16th century, at the time of the Reformation, and the two early schools are known as *Empiricism* and *Idealism*. The Empiricists have their strongest early representative in Bacon, who, in 1620, published his "Novum Organum," in which he exemplified the inductive method of studying nature. It was his view that the philosopher should make the benefits to mankind a direct object, and, instead of wasting time on ingenious theories about mind and matter, he should gather facts by watching the phenomena of life and seek to reach the general law by reasoning from effects back to their causes. This work exercised a wide influence in establishing modern methods of investigation, but the value of this method had been proven long before by Ptolemy, Archimedes, and Galileo. The *Idealists* were represented by Descartes, who held views opposite to Bacon's, and believed that philosophical research should be based largely upon rational theories formed by mental speculations.

Later philosophers gave inquiries relating to the mind of man greater consideration. This caused more highly specialized lines of study to be undertaken and the term philosophy came to be applied variously. Among these philosophers may be named Kant, Leibnitz, Fichte, Hegel, Schelling, Spinoza, Herbart, Richter, Darwin, Spencer, Haeckel, and many others. It is now held to be the office of philosophy to submit propositions to a critical analysis and discover why things are as they are, hence the philosopher endeavors to reach a conclusion as to the ultimate nature of the real. It must involve the element of its possibility, since any theory of the universe having an impossibility as a central fact is at once false and absurd.

PHLOX (flōks), a genus of plants with opposite leaves and beautiful flowers. The numerous species are mostly herbaceous, but some are shrubby plants. Nearly all are tall, erect, and perennial. The flowers appear in clusters at the upper end of a stalk and are white, blue, purple, lilac, or crimson. Most of the species

are native to North America, the only exceptions being a few that are found in Asia. Among the familiar species are the *creeping pink* of the South and the *sweet William* found in the central part of North America. The latter blooms in the spring and early summer and has bluish or lilac colored flowers. *Drummond's Phlox* is a favorite species and is cultivated extensively. It is an annual and blooms profusely until frost comes.



PHLOX.

PHOCION (fō'shī-ŭn), celebrated general of Athens, who was born about 402 B. C. He descended from humble parentage, studied under Plato and Diogenes, and attracted public attention for the first time in 376 B. C., when he aided the Athenian fleet in securing a victory at Naxos. Later he defeated the forces of Philip of Macedon in Euboea. In 340 B. C. he compelled Philip to raise the siege of Byzantium and afterward to evacuate several adjacent strongholds. When Demosthenes delivered his celebrated *Philippics*, Phocion resisted that statesman, for the reason that he desired peace rather than war. He also advised a peaceful policy at the time the Athenians advocated the war with Antipater, and later was compelled to drink hemlock for being charged with intrigues to deliver positions of trust into the hands of the enemy. However, these charges were afterward found to be groundless and many monuments were raised to his honor. His life was written by Plutarch, who asserts that he was elected 45 times as commander without seeking the office and that he lived on a small farm, on which he cultivated cereals and fruits.

PHOEBE (fē'bē), or **Pewee**, a small bird of the flycatcher family, found in many parts of North America. It frequents gardens and orchards and is called *pewee* from its call. The head is brown and the general color is olive-green. It constructs a nest of mud and moss, which is attached to rocks and cliffs, or frequently to the eaves of houses and the piers of bridges. The eggs are white and usually two broods are reared in a season. In autumn these birds move southward to spend the winter.

PHOEBUS (fē'būs), an epithet commonly applied by the Grecians to Apollo, which had special reference to the youthful beauty and purity of that deity. In like manner they frequently applied the name Phoebe to Artemis, the moon god. The Roman poets and many modern writers apply the names *Phoebus* and *Phoebe* to the sun and moon respectively.

PHOENICIA (fē-nīsh'ī-à), a country of an-

cient times, situated on the eastern coast of the Mediterranean Sea. It stretched along the coast a distance of about 125 miles, beginning in the south a little below the Carmel promontory and extending north to the Island of Aradus. The average breadth was about twenty miles.

DESCRIPTION. The soil in the valleys is generally of alluvial origin, being formed largely from the deposits of streams descending from the mountains along the eastern boundary, while adjacent to the sea are extensive sand dunes. Two plains characterize the surface, one at Eleutherus in the north and another inland from Acre, but the mountains trend to within a few miles of the coast at several intermediate points. The narrow coast plain is noted not only for its fertility, but because of having been a favorite route for caravans from remote antiquity. Few indentations characterize the coast, but in former times a number of excellent harbors were maintained. These are now silted up and scarcely available for large vessels of modern construction. A number of small islands lying off the northern shore were included with ancient Phoenicia. The mountains were not particularly productive in mineral wealth, though amber and several other minerals were secured, and the forests possessed timber of remarkable value. However, only small remnants of the once famous cedars of Lebanon remain. An abundance of streams flow from Lebanon to the sea, providing excellent drainage and an ample supply of water power. This country, now held by the Turks and populated with a general mixture of peoples, was once the seat of a great historic people, who built the powerful cities of Tyre and Sidon, constructed highways and aqueducts, and exerted for centuries an extensive commercial and military influence in Asia, Europe, and Africa.

HISTORY. The Phoenicians have a history which extends through a period of more than 2,000 years, but it has not been definitely settled as to their original seat, nor as to the time when they formed settlements on the Mediterranean. They were Semites by race and their language shows that it, like that of the Jews, belonged to the northern Semitic group. Herodotus, the Greek historian, considers the vicinity of the Persian Gulf to have been the original seat of the Phoenicians, while other writers think they had their prehistoric origin in the region of the Dead Sea and that they emigrated to the coast because of earthquakes. They called themselves Canaanites and their land was known as Canaan, but the latter name extended also to the regions occupied by the Israelites. When the Israelites invaded Canaan, no marked change was made in the geography of Phoenicia. It had been assigned to the tribes of Asher, Dan, and Naphtali, but they conquered only a small part of it, and the relations maintained between the Israelites and the Phoenicians were mostly those of friendship. They not only con-

ducted commercial intercourse between each other, but evidences exist that the two peoples maintained social relations to at least some extent. This is proven by a treaty made between Hiram, King of Tyre, and David, and by the marriage of Ahab to a princess of Phoenicia.

The ancients generally thought that the Phoenicians were the inventors of navigation, though this is not at all certain. However, it is true that their ships excelled those of the Greeks in speed. They possessed vessels of excellent construction and had officers whose skill in manning, loading, and directing the vessels was unrivaled. They were pioneers in planting colonies with the view of enlarging trade. For this purpose they founded successful settlements in Cyprus, Rhodes, and the islands of the Aegean Sea. Later they passed through the Strait of Gibraltar and founded colonies on the western coast of Spain and Portugal and on the northwestern coast of Africa. Their voyagers cruised on the coasts of Hindustan and among the East Indies, which they reached from the Red Sea. In Northern Africa they founded Carthage, which was their most powerful settlement. Ultimately they brought Spain into subjection and long rivaled the imperial power of Rome. It appears that their government at the time of the exodus of the Israelites was administered exclusively by chiefs or kings, each being limited in the exercise of large powers in a particular city or town. Later Sidon became the seat of influence over all other states, but this distinction finally passed to Tyre.

Hiram was the last powerful King of Tyre. He was succeeded in 947 B. C. by his son, Ba-lestartus, who died seven years later. The reign of Hiram was the golden age of Phoenicia, when the manufactures, commerce, and educational institutions were the most brilliant. His administration includes a period with as much splendor and prosperity as that of Solomon among the Israelites. Shalmaneser, King of Assyria, invaded Phoenicia about the middle of the 8th century, after that country had been disturbed by internal strife and invasions, but, after laying an unsuccessful siege on Tyre for five years, he concluded a peace favorable to the Phoenicians. Two centuries later Phoenicia was conquered by the Assyrians, subsequently it became a part of Babylonia under Nebuchadnezzar, and finally Cyrus the Great annexed it to the Medo-Persian Empire. During this time the cities retained a large part of their former independence. When Alexander the Great made his memorable invasion of Asia, the last vestige of independence passed away. Since 65 B. C. it has been a part of Syria.

PEOPLE. The Phoenicians were not only skillful manufacturers of woolen and cotton fabrics, but they excelled in producing metal ware, jewelry, utensils, ornaments, ivory products, and earthenware. Tyre was noted as a producer of dyes from shellfishes and wood, and Sidon de-

veloped vast enterprise in the manufacture of glass. Their mines were constructed for convenience both in workmanship and sanitary regulations, and their architecture showed great inventive skill. Fishing, agriculture, farming, and fruit growing developed into vast enterprises. Later these arts were introduced to the colonial possessions. Some writers attribute to them the invention of arithmetic, lineal measurements, a graduated standard of weight, and writing, though others think they merely introduced these arts from the Babylonians to the nations of the Mediterranean. That their language was closely allied to Hebrew is evidenced by their proper names and by numerous tablets relating to the sacrificial ritual, for the reason that they contain many words found in the Old Testament. The alphabet consisted of 22 letters and the words were written from right to left. Their worship was a form of nature worship, or pantheism, and the sun, the moon, and the five planets then known were the objects of special adoration. Baal and Astarte were their two principal deities, the former representing the male and the latter the female. Human sacrifices were offered at an early period to their god Il, who corresponded somewhat to the Moloch of the Ammonites. Only fragments of their literature and inscriptions remain.

PHOENIX (fē'nīks), the capital of Arizona, county seat of Maricopa County, on Salt River, about fifteen miles above its junction with the Gila River. It is on the Southern Pacific and the Santa Fé, Prescott and Phoenix railroads. The surrounding country has extensive mining interests and produces grain and fruits. Among the noteworthy buildings are the county courthouse, the city hall, the high school, the capitol building, the insane asylum, and the agricultural station. It has a public library, an Indian school, and the Sacred Heart Academy. The industries include machine shops, stock yards, and grain elevators. It was settled in 1870 and incorporated in 1881. Population, 1920, 29,053.

PHOENIX, a mythical bird of Egypt, represented as a species of plover with red and golden plumage, and often described as having human arms. The bird has been mentioned in history in various connections and has been associated with the Sothiac cycle by some writers, who supposed it to return every 500 years. Herodotus and others recount that the bird, at the age of 500 years, transformed itself into a new being by kindling a fire of aromatic gums and wood and burning up the old. The Phoenix has been used as a symbol of immortality by the Egyptians, and it appeared upon the coins of Constantine in 334 A. D. The Jewish rabbins supposed it to be alluded to in the Old Testament, particularly in Job xxxix., 18, and in Psalm ciii., 5.

PHOENIXVILLE (fē'nīks-vīl), a borough of Pennsylvania, in Chester County, on the Schuylkill River, 26 miles northwest of Phila-

delphia. It is on the Pennsylvania and the Philadelphia and Reading railroads. The features include the public library, the high school, the hospital, and a public park. It is the seat of the Pheonix Bridge Company, which employs about 2,500 men. Among the manufactures are needles, hosiery, silk, shirts, nails, hardware, pottery, and machinery. The surrounding country produces cereals and fruits. Phoenixville was settled in 1792 and incorporated in 1849. Population, 1900, 9,196; in 1920, 10,484.

PHONETICS (fō-nēt'īks), or **Phonology**, the science of elementary sounds uttered by the human voice, showing their functions, their interchanges, and their relations one to another. Voice is modulated into speech by the lips, tongue, teeth, and palate. Many animals have *voice*, but man alone has *speech*. It is possible to teach the raven and other birds to speak by rote, but man alone associates profound meaning with the word sounds. Speech is a modification of the vibrations generated by an outward passage of air between the vocal cords of the larynx, the modification taking place as the vocalized sound passes through the cavities of the mouth and nose. The power of speech is controlled by the nerve centers that act upon the centers of voice, and these nerve centers are seated on the left side of the brain. Articulate speech is prevented when the nerve centers controlling it are injured, but vocalization is not necessarily stopped, neither is the expression of thought by writing or by signs prevented.

Articulate sounds are divided into vowels and consonants. The English language has 26 letters, but there are 40 elementary sounds, this being due to the fact that a number of the letters have more than one elementary sound. *Vowels*, or *vocals*, consist of pure tone only. They are generated in the larynx and are made with the vocal organs open. A nasal quality is acquired when the back entrance to the nostrils is closed. The vowels include *a*, *e*, *i*, *o*, *u*, and sometimes *w* and *y*. The *consonants* are formed entirely in the parts above the vocal cords, the outward current of air being modified in various ways in its course through the throat and mouth. The six classes of consonants include labials, linguals, linguo-dentals, linguo-nasals, palato-nasals, and palatals. *Labials*, or *lip sounds*, are made or modified by the lips; *linguals*, or *tongue sounds*, by the tongue; *linguo-dentals*, or *tongue-teeth sounds*, by the tongue and teeth; *linguo-nasals*, or *tongue-nose sounds*, by the tongue, the sound passing through the nose; *palato-nasals*, or *palate-nose sounds*, by the palate, the sound passing through the nose; and *palatals*, or *palate sounds*, by the palate.

English spelling and pronunciation are extremely difficult, owing to the large number of silent letters. The use of letters and combinations of letters as substitutes for other letters, and the combination of letters to represent sounds for which there are no single representatives,

make it difficult for students to acquire easily the power to speak the language. Scholars who claim to be able to spell all the words in the ordinary vocabulary are comparatively few in number. These conditions have caused a number of writers to propose the substitution of a practical alphabet for English and for other languages possessing similar difficulties. These writers have suggested that the new alphabet should supersede the ones at present in use, or that radical improvement should be made, whereby it would become a less difficult task to teach and learn to read, write, and speak the language. Thus far little progress has been made in securing the adoption of such reforms in English spelling, and the only changes brought about are in isolated cases where silent letters have been omitted. The most prominent of these are such words as *program*, *catalog*, *oxid*, *paraffin*, *decalog*, etc., but many writers refuse to recognize even these reasonable and moderate reforms.

PHONOGRAPH (fō'nō-gráf), an instrument for recording and reproducing the vibrations of sound. It was invented by Thomas A. Edison in 1877 and has been improved until now instruments of great perfection and utility are in extensive use. The phonograph depends upon the principle of acoustics that sound from a given source spreads in a series of waves, and that its intensity at any distance depends upon the pitch and volume of the original note. This is the underlying principle of the telephone, in which the vibrations of the diaphragm are given out with such rapidity as to constitute a faithful reproduction of what was spoken into the transmitting telephone. In the phonograph a record of sound vibrations is obtained, whether of the human voice or any other agency, and these vibrations are reproduced mechanically at any future time. The three principal parts consist of the sound receiver, the recorder, and the reproducer.

The *sound receiver* of the early phonographs consisted of a tube having a metallic diaphragm at one end, at the outer surface of which was a sharp point or stylus, and at the other end of the tube was an open mouthpiece. The *recorder* consisted of a cylinder, usually four inches in diameter, and over it a sheet of tinfoil was placed. When words were to be recorded, the sound receiver was adjusted so the point of the stylus passed lightly over the tinfoil and the cylinder was turned rapidly, the apparatus for moving it having a screw as an axis, so as to give motion that was sidewise as well as circular. A series of indentations in the tinfoil were caused by the sound vibrations in the diaphragm, and the continuous movement of the instrument had the effect that the stylus traversed the tinfoiled cylinder from end to end. Thus prepared, the next step was to call into action the third part, the *reproducer*. This was done by again bringing the cylinder under a

stylus attached to a diaphragm, and, as the cylinder revolved, vibrations were produced similar to those created by the voice when making the record, this resulting from the stylus being affected by the inequalities in the indented tinfoil. Many of the instruments now in use are of this construction and still retain practically all the principal mechanical features enumerated above.

In 1889 Edison replaced the tinfoil by a wax composition, and later introduced the wax cylinder. Other improvements include constructing the diaphragms of glass and placing a sapphire point on the stylus. Instead of the cylinder being turned by hand, it is now moved by clockwork and the larger instruments are rotated by an electric motor. A trumpet or funnel serves to facilitate utterance into the instrument when the record is made, as well as when it is reproduced, or the communication may be heard through tubes having tips to fit the ears. The wax composition attached to the cylinder is so constructed that it may be used several times by shaving off the record and placing another on in the usual way. A kind of phonograph known as the *graphophone* has a wax-covered cylinder instead of one made entirely of wax. Emile Berliner is the inventor of the *gramophone*, which employs a disk that revolves on a horizontal plane. The disk is made of hard rubber. This instrument is now in very extensive use.

The purposes for which a phonograph may be used are numerous. It is employed to a limited extent by business men in making records for typists, who afterward write the communications on typewriters. However, it is used most extensively for taking speeches, musical selections, songs, essays, and orations to be heard for amusement or instruction. It is noteworthy that, when reproducing at the same rate of speed as when uttering the communication, the sounds are identical to the original. By using a funnel it is possible to make them sufficiently loud to be heard at some distance from the instrument. Cylinders containing records may be kept for a long time, hence it is possible for persons to enable their posterity to hear the exact sound of their voice.

PHONOGRAPHY (fō-nōg'rá-fŷ). See **Shorthand**.

PHOSPHATE (fös'fât), a generic term used in chemistry to denote a salt of phosphoric acid. It is an essential element in the chemistry of plant and animal life, entering in different proportions into the tissues of living organisms. Phosphate of soda, basic phosphate of magnesia, and phosphate of lime are the most important. Many of the poorer agricultural lands need to be fertilized by supplying phosphatic manures for the production of crops. Where such is the case, the phosphates are placed in the soil with the planted seeds. They consist principally of ground bones, phosphatic guano,

bone ash, and mineral phosphates. The United States produces more phosphate than any other country. At present the annual output is 1,650,000 tons, which has a value of \$5,125,000. Florida, Tennessee, and South Carolina yield large quantities.

PHOSPHORESCENCE (fös-för-ēs'sens), the property possessed by some bodies that enable them to emit light without giving off sensible heat. This phenomenon is due in some cases to chemical action and in others to physical. It is induced in certain mineral substances by exposure to a strong light, to friction, to heat, or to electricity. Nearly all bodies are phosphorescent after exposure to strong light, but this form of the phenomenon is of brief duration, in many instances less than a second. Some animals and certain classes of plants become phosphorescent when in a state of decay, especially certain species of fishes and various kinds of wood. Many species of the jellyfishes are phosphorescent and certain parts of the sea-pens, fireflies, glowworms, and numerous deep-sea fishes possess this property. It is possessed by many forms of fungi, some liverworts, and algae. In the tropical seas and some of the temperate climates phosphorescent lights appear on the surface of the water at night, being produced by the bodies of certain microscopic animals. The hairs of the cat and many other animals give off light if rubbed in the dark when warm. Heavy friction on rocks, salt, and sugar produces the same effect. Certain fishes have the property of converting nervous energy into electricity when disturbed.

PHOSPHORIC ACID (fös-för'ik), the principal acid formed by the element phosphorus and found native in the form of calcium salt. In the laboratory it may be obtained by burning phosphorus to convert it into an oxide and then boiling in water, or by oxidizing phosphorus with nitric acid. Phosphoric acid is found in the ashes of bones and may be obtained on a large scale from bone ash by treating with sulphuric acid, then filtering and evaporating. In a pure state it is a colorless crystalline substance. The most important uses of this product are in medicine, in the form of a solution or diluted acid. It is prescribed in treating softening of the bones and diseased conditions of the mucous membrane.

PHOSPHORUS (fös'för-üs), one of the elements, which was discovered by Brandt, of Hamburg, in 1669. It is nonmetallic, is almost colorless, and forms a waxlike solid. At ordinary temperatures it may be readily scratched by the finger nail. The density compared with water is 1.83. It melts at 180°, boils at 550°, and, owing to a slow oxidation, is luminous in the dark. Water will not dissolve it, but it is soluble in most oils. Being highly inflammable, it must be handled with much care when exposed to air, and for safety against spontaneous combustion it is necessary to keep it under

water. It is set on fire in the open air by the friction resulting from pressure between the fingers and by the hand when rather highly warmed. Phosphorus has an energetic affinity for oxygen, and, when united with it in burning, the flame becomes more vivid. It is very poisonous, and, when poisoning by it is not quickly followed by death, usually fatal forms of diseases of the heart, liver, kidneys, and tongue are produced.

Phosphorus is found in a state of combination in the soil, in unstratified rocks, and in many parts of the bodies of plants and animals. The larger part of this element sold in the trade is obtained from the bones and urine of animals. In preparing it from bones, they are first burned and treated with two-thirds of their weight of sulphuric acid diluted with water. The liquid portion is then evaporated, and, after mixing with charcoal, the remaining portions are desiccated by heating in an iron vessel. The dry mass is then placed in a stone retort, in which it is heated, and the phosphorus is conducted through a worm into water, where it is collected for use. Phosphorus is used for making matches, in preparing vermin poisons, and largely for medicine. It unites with most of the metals and forms *phosphides*. The compounds of phosphoric anhydride with basic bodies are known as *phosphates*. *Amorphous phosphorus* is a reddish-brown modification of phosphorus obtained by heating common phosphorus to about 450° in air-tight vessels. It is used for safety matches.

PHOTIUS (fō'shī-üs), eminent patriarch, who is celebrated because of his interest in advocating the separation of the Eastern and Western churches. He was born in the early part of the 9th century at Constantinople, where he secured a liberal education, and was an incumbent of several public offices. After serving on a diplomatic mission to Persia, he became secretary of state under Emperor Michael III., and in that capacity obtained the friendship of Caesar and the minister, Bardas, uncle of Emperor Michael. Ignatius was at that time patriarch of Constantinople, but he incurred the displeasure of the emperor and was deposed and exiled. Photius was supported for the patriarchal dignity by Bardas, and, though only a layman, was appointed to that important position. Two successive councils of bishops confirmed the election, but Pope Nicholas I. opposed him and favored reinstating Ignatius. An extended controversy resulted, in which the emperor took a position opposite to the Pope, but the latter excommunicated Photius. However, he retained possession, since he was supported by the emperor, and in 867 convened a council at Constantinople, which raised questions of discipline and doctrine between the Eastern and Western churches.

In the same year Emperor Michael was murdered by Basil and the latter prince was raised

to the throne of the Eastern Empire. He immediately restored Ignatius and banished Photius, but at the death of the former, in 878, Photius resumed the office. Shortly after a council was called at Constantinople by which the Western church was condemned on a doctrinal point, and from that time the official division of the Greek Church from the Roman Church may be said to date, though the separation was not completed until some time later. Photius was banished to a monastery in Armenia, in 886, on the accession of Leo, son of Basil, and he died there in 891. He is celebrated as a man of profound learning, rare genius, and cultivated literary judgment. Among his works are "Myriobiblion," a review of ancient Greek literature, and "Nomocanon," a collection of the acts and decrees of councils prior to the seventh ecumenical council. Many translations from his works have been made, especially into Russian and German.

PHOTO-ENGRAVING (fō'tō-ĕn-grāv'-ing), the term applied to a process of engraving, in which certain chemical substances combined with the action of light take the place of the work on an engraver. It is so named from the processes employed, which include photography and a form of engraving by chemicals. The picture or portrait to be engraved is transferred by means of photography to the block or plate, which, when completed, contains a printed surface. See **Photogravure**.

PHOTOGRAPHY (fō-tōg'rā-fy), the process of producing pictures by the action of certain sensitive substances under the influence of light. The art had its beginning with the discovery that fused silver chloride darkens on exposure to light. This discovery was made about 1600, but there was scarcely any progress in developing the art until in 1777, when the Swedish chemist, Scheele, found by numerous experiments that the darkening originates from the violet end of the solar spectrum. In 1802 successful experiments were made by Thomas Wedgewood in taking profiles upon paper with nitrate of silver under the influence of the light of the sun, and shortly after he published his method. However, no process was known for rendering permanent the objects taken in that way until in 1814, when Joseph Nicéphore Niepce (1765-1833), a French chemist, discovered a method of producing pictures on plates of metal covered with a coating of asphaltum and devised the means to secure permanency. This process became known as *heliography*. The present art of photography was discovered by Daguerre in 1839, when he found a method of taking pictures on silver-plated copper plates. The process consisted of exposing the plate for a short time in a camera, and afterward it was developed in a dark room by exposure to mercurial vapors. While his discovery laid the foundation for photography, his methods have gone largely out of use on account of newer

and more rapid processes. The so-called *wet-plate process* was perfected by Scott Archer in 1851 and the collodion *dry-plate process*, by Hill Noyes in 1856.

RECENT IMPROVEMENTS. The more recent discoveries include the preparation of collodion emulsion dry plates, the proper care and treatment of dry plates, and the photography of natural colors. The last mentioned, known as *color photography*, is one of the most remarkable discoveries of recent times. It is generally attributed to Mayall, who, in 1887, published some valuable information in regard to securing quite satisfactory results in photographing the natural colors of some objects with which he had experimented. The usual method consists of taking three negatives of the colored object, respectively through screens of green, red, and blue-violet. Positives are now made of these negatives, usually on a clear glass, and they are combined and projected through a magic lantern, when a picture in the natural color is obtained. *Phototelegraphy* (q. v.) is still a newer invention. Other improvements that may be cited include good results by the use of artificial light, the instantaneous process for photographing objects in motion, and the methods of making pictures by the use of the X-ray. The *instantaneous process* requires exposure for only about one-three-hundredth of a second, making it possible to photograph a moving train or a bolt of lightning with good results. The *X-ray method* has added much value to the medical practice, since by its application it is possible to prepare a photograph of a bullet located in the body, or a good view of any foreign substance or abnormal growth with which a patient may be affected internally.

METHODS. Many processes are now utilized in photography, hence it would be quite impossible to describe in detail all the kinds employed. The more general method is to prepare the photograph on a glass plate that has been sensitized before putting it into the camera. This is done by coating one side of the glass with a thin film of collodion. The collodion is prepared in various ways, usually by a solution of gun cotton in ether and alcohol. The glass plate is next treated in a bath containing a mixture of water and nitrate of silver. It is necessary to put the silver nitrate on in a dark room, and light must not fall upon it until it is exposed to the object to be photographed, for the reason that exposure to light darkens the film. Since the preparation of plates is a distinct industry, they are obtained ready for use by the photographer. When a photograph is to be made, the glass plate is put into a camera, an instrument in the form of a dark box, with a glass screen, as shown by Fig. 1 in the illustration. The camera is pointed toward the object of which a picture is to be made, and, when properly adjusted, its cover is removed for the purpose of allowing the lens to throw

an image of the object upon the sensitized plate. Amateurs usually employ ribbons of film, which have a back of celluloid and are put up in rolls, ordinarily for six or twelve exposures.

The impression is so delicate that it cannot be seen, but by washing the plate in a solution of pyrogallic acid, or some similar chemical, the negative is developed. When the picture has been sufficiently brought out, the plate is washed in hyposulphite of soda and dried, and the side containing the film is varnished to prevent its being injured by rubbing. After it is carefully retouched by the artist to remove all imperfections it is ready to print the photographs. In this form it is called the *negative*, while the photograph, which is printed from the negative, is termed the *positive*. The paper used for the

ed with nitrate of silver, receives impressions to represent exactly the object photographed. The artist is governed by the intensity of light and the character of the negative in taking the prints. When sufficiently exposed, the picture is taken from the frame, is washed in a solution of soda to take out the silver nitrate not turned brown, and it is then *toned* by washing in a bath containing chloride of gold. It is next fixed by a varnish and pasted to a cardboard. The size of a photograph depends upon the size of the instrument and its distance from the object taken.

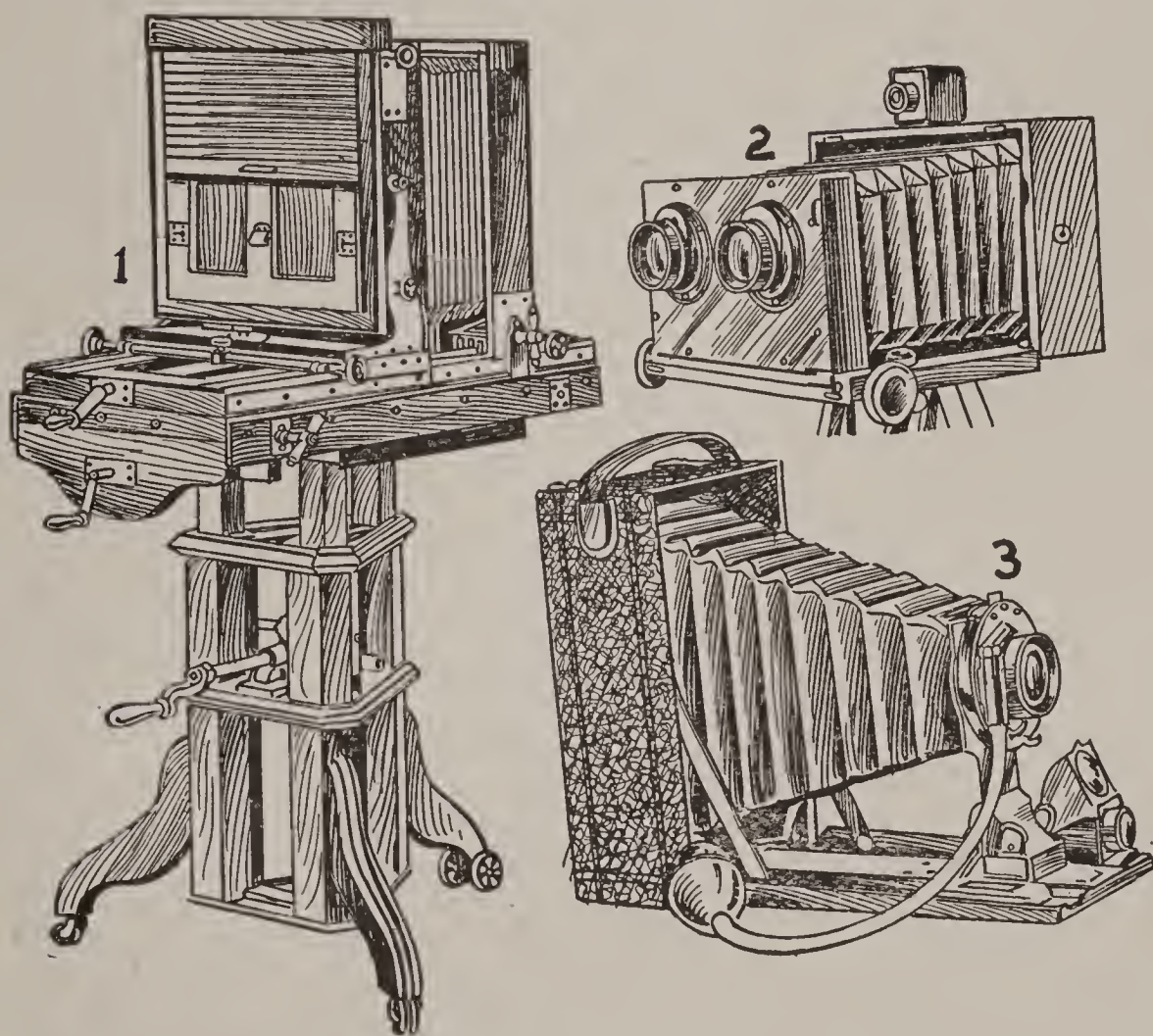
Astronomical photography is a comparatively new field of research. By the use of powerful telescopes it is possible to secure excellent photographs of stars and clusters of stars not

visible to the naked eye.

The first experiments in this now extended field were made by John W. Draper, of New York City, in 1843. Within recent years the *kodak*, a kind of portable camera, see Fig 3, has become popular for taking *snap shots* as well as making *time exposures*. Both snap shots and *flash lights* are obtained by instantaneous exposures. A *stereoscopic camera*, see Fig. 2, is used in making views for the *stereoscope* (q. v.). By means of *photomicroscopy* it is possible to photograph microscopic objects for future examination. Besides photography has wrought many improvements in lithography, the name *photolithography* being applied to the reproduction of photographs from a lithographic stone. These improvements and others have revolutionized book and newspaper

illustrating and have greatly popularized all classes of periodicals.

PHOTOGRAVURE (fō-tō-grāv'ūr), the art of producing by photography plates for printing. The earliest attempt to prepare engraved plates by this process dates from 1827, when Joseph Nicéphore Niepce, of Paris, found that light vigorously affects thin plates of bitumen. He soon after coated a number of metal plates with a thin film of albumen and exposed them to an image for several hours by means of a powerful camera obscura. These were next treated with oil of spike to dissolve the parts not affected by exposure to light, which, however, did not affect the other parts. A treatment with strong acids further lowered those parts, thus producing a complete etching plate



PHOTOGRAPHIC INSTRUMENTS.

1, Camera mounted for use; 2, Stereoscopic Camera; 3, Kodak.

photograph can be secured in the market, or it may be prepared by coating thin sheets of paper with a mixture of albumen from the whites of eggs and chemicals. This prepared paper, usually called *print-out paper*, is next treated with a film of silver nitrate, when it is placed in a frame next to the negative and exposed to the light of the sun or to an electric light of much intensity.

The negative differs from the positive in that the dark parts of it represent the light portions of the objects photographed and the light parts, the dark portions. When light is applied to the negative, there are imprints on the paper below exactly opposite, as the light and dark shades are differently affected by the light passing through them, and the paper below, being coat-

from which any number of impressions could be taken on paper. Since then many improvements have been made and the art has been productive of results quite equal to a photograph. However, the cost of securing pictures by this process has confined its use largely to the better class of book and magazine work. Many processes are employed successfully for all classes of printing. Usually a photographic film is laid on a metal plate and is exposed to the action of light under a negative. A certain per cent. of graphite is mingled with the gelatin film, which causes the surface to assume a grain corresponding exactly with the lights and the picture. When placed in an electrotype bath, the granular surface conducts currents of electricity and thus takes on a coating of copper. The copperplate prepared in this way may be used in a press for printing on paper, but grades of paper which have a fine surface finish are preferred.

PHOTOMETRY (fō-tōm'ē-trŷ), the science of measuring the intensity of a source of light. Since it cannot be measured in terms of watts, or an absolute standard, it is customary to compare the intensity with that of a standard of reference, such as a representative source of light, although no completely satisfactory standard has been proposed. An instrument used for this purpose is called a *photometer*. In the Bunsen photometer a sheet of paper supported in a frame is used. This paper has a greased spot, through which the light passes more readily than through any other part of the paper. The paper is placed between two lights and moved backward and forward until a position is obtained at which the spot disappears, which occurs when the paper is equally illuminated on both sides. For instance, if a light is one foot from the screen and another light of equal power is two feet from it, it follows that the former has four times the luminous intensity of the latter. In the Bouguer photometer an upright rod casts a shadow upon a white screen placed behind it. When the light comes from only two sources, such as two lamps placed at different distances from the screen, it is possible to determine the intensity of the light by that of the shadows upon the screen.

PHOTOPHONE (fō'tō-fōn), an instrument by which sound may be transmitted along a beam of light instead of a wire, as in the telephone. Inventors have produced a number of similar instruments called *radiophones*, but the photophone proper has a good representative in the invention of A. G. Bell, completed in 1880. This instrument contains as an essential feature a cell made of the rare metal selenium, which, when acted upon by light, offers more or less opposition to the passage of electricity. It has a plane mirror of silvered glass or mica, from which a parallel beam of powerful light is reflected toward a parabolic reflecting mirror, in the focus of which is a selenium cell, connected

with a battery and a telephone. Any sounds which cause the diaphragm to vibrate produce a corresponding variation in the reflected light, and this in turn alters the resistance of the selenium cell to the current of the battery and at the end of the attached telephone becomes audible as vocal sound. The photophone may be used only at short distances, but articulate sounds may be transmitted by sun or any artificial light, even by an ordinary kerosene lamp.

PHOTOTELEGRAPHY (phō-tō-tē-lĕg'rā-fŷ), or **Telephotography**, the art of reproducing pictures or photographic images of visible objects at a distance by electricity. It is due to the discoveries of Arthur Korn of Germany, who perfected the first instrument, known as the *telephote*, in 1906. The first station to transmit drawings, photographs, and the like by this



Picture transmitted by Korn's telegraphic camera.

method was established at Munich in 1907, since which time the art rapidly assumed commercial importance. Besides the instruments invented by Korn, others are in extensive use, particularly those of Knudsen and Carbonelle.

The principal part of the Korn telephote consists of a film, which contains the drawing or photograph to be transmitted and is mounted on a cylinder with a screw motion similar to that of a phonograph. A pencil of light is focused on the film, in such a manner that it falls on a selenium cell, which is connected in a series with a battery and the telegraph line. When the cylinder is caused to revolve, the

light which falls on the film varies according to the variations of the film, hence corresponding changes are caused in the current on the line. The current at the receiving end passes through a Geissler tube and causes corresponding fluctuations in the light from this tube, which is focused on a sensitive film mounted on a revolving cylinder similar to the one at the sending station. The Carbonelle instrument employs a metallic stylus, which is brought in contact with a revolving film of varying conductivity, depending upon the density of the photograph which is printed upon the surface. A similar metal stylus is at the receiving end, hence the photograph is engraved as the films are put in motion when they are brought in contact in series with a battery. Knudsen, in 1908, adapted his phototelegraphic apparatus to operate a linotype composing machine, but it is doubtful whether this method can be made practical.

PHRENOLOGY (frě-nöl'ō-jŷ), the art of determining the mental and moral faculties of an individual and indicating their qualities by measuring the development of the brain upward, forward, and backward from the medulla oblongata, the measurement being by cranial diameters and distances from the openings of the ears. As a doctrine it teaches that the brain is the organ through which the human mind acts, and that a relation exists between the several faculties of the mind and particular portions of the brain. According to this view the brain is not strictly a single organ, but consists of a number of different organs having close interdependence, but each of them is influential in some particular line, or has some special function. It has been held from ancient times that the brain as a whole is the part of the human body through which the mind operates. The first attempts to localize the several faculties were made by Franz Joseph Gall (q. v.). He gave a course of lectures on this subject at Vienna in 1796 and was soon after joined by Johann Gasper Spurzheim (1776-1832), a German physician. The two prepared a chart of the cranium and to each small section assigned the dwelling or location of a certain propensity, sentiment, or inclination.

Later Spurzheim divided the 35 mental faculties enumerated by Gall into *feeling* or *affective*, and *intellectual*. The feeling, or affective, faculties were subdivided into *propensities* and *sentiments*. According to his view, the former produce desires, or inclinations, while the latter along with them excite some higher emotion. The intellectual faculties were divided into *perceptive* and *reflective* propensities and all were localized on the skull. In 1807 Gall and Spurzheim visited Paris, where they lectured for a number of years and succeeded in securing the appointment of a commission by the Institute to investigate the system, but this resulted in an unfavorable report, which was drawn by

Cuvier, the celebrated naturalist. Soon after Spurzheim visited England, where he found an enthusiastic supporter in George Combe, who is the author of the celebrated work entitled "System of Phrenology." Many specialists have verified a number of the principal claims made by Gall and Spurzheim. Some of them are well established and have a place in scientific physiology.

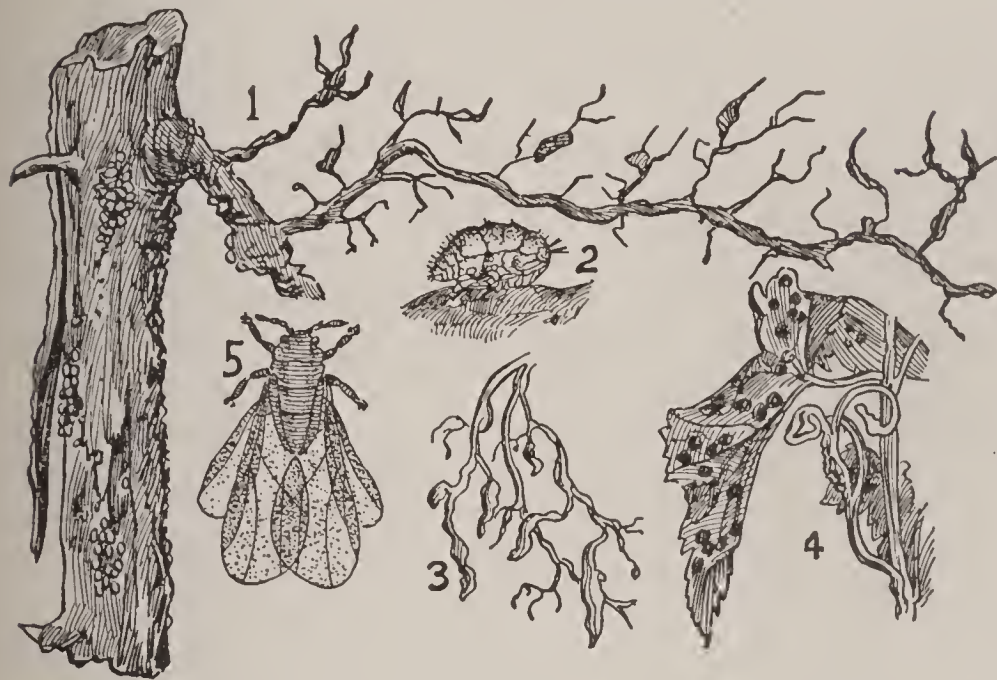
Another school of phrenologists base their system on protuberances and depressions of the skull, this particular branch being sometimes called *craniology*. While physiology verifies to a limited extent the claims made by craniologists, their data and conclusions are both general and uncertain, for the reason that the intervening flesh, skin, and hair do not allow an accurate estimate of the protuberances and depressions, and because the hollows on the inside of the skull do not always correspond to the elevations on the outside.

PHRYGIA (frij'ī-ā), the name applied anciently to a large country in Asia Minor, inhabited by a class of people called Phryges by the Greeks. The boundaries varied at different periods, including at one time most of the peninsula, but comprising for the greater period of its history the west central part. Their language was closely allied to that of the Greeks, and they bore a close kinship to the tribes of Thrace and Macedonia. Historians are uncertain as to the early history of Phrygia, but it is thought that the kingdom rose from an older civilization, this being evidenced by a few monuments still remaining. The Phryges engaged in stock raising, mining, and agriculture, giving marked attention to the cultivation of vines and fruits. Laodicea, Apamea, and Colossae were their principal cities, in which they built many temples and monuments, a fact verified by extensive ruins. Phrygia was overrun by the Cimmerians in 670 B. C., when King Midas of Phrygia lost his life, and ten years later the country was made a province of Lydia. The Persians annexed it in 549 B. C., under Alexander the Great it became a Grecian territory, and later it formed a part of the province of Asia under the Romans. The inhabitants were noted for their stubborn resistance to oppression, for advancement in civilized arts, and for the influence exercised by their religion upon the mythology of Greece. At present most of the region is included with the Turkish vilayet of Kodavendighiar.

PHYLLOXERA (fīl-lōx-ē'rā), a genus of lice classed with the aphidae, which feed as parasites on many kinds of plants. The most noted species is an injurious pest to the vine. This form is native to North America, where it was first observed in 1854, but since it has been carried to practically all countries in which the grape vine is cultivated. It infested the native grapes at the time America was discovered and with the development of grape culture

it began to attack the cultivated species, but for many years the cause of grape destruction by this insect was not understood. The insect infests both the roots and the leaves of the vine, as shown in the accompanying figure. The forms infesting the roots are the wingless females (2), which suck the sap by means of an elongated rostrum and cause swellings of the rootlets. These wingless females multiply parthenogenetically; that is, by means of unfertilized eggs without the intervention of a male, but after a few generations winged females are produced.

The winged females feed on the leaves and buds, where they lay two sizes of eggs, from the smaller of which wingless males develop



PHYLLOXERA.

1. Roots on which the young are working; 2, female pupa; 3, roots on which the young are beginning to work; 4, leaf covered with galls; 5, winged female.

and from the larger, wingless females. After fertilization, the female lays a single egg in the fall, from which a wingless female, the stock mother, is hatched in the spring. The stock mother forms galls on the underside of the leaf and multiplies parthenogenetically with rapidity, some of the offspring forming new galls, while others descend to the roots. When the vine is infested by a large number of these insects, the roots become knotted and deformed, and the leaves indicate a diseased condition by turning yellowish, and later life becomes totally extinct. These insects have been distributed in commerce by transporting cuttings and vines. They were particularly destructive in France from 1865 to 1867 and in Germany in 1881, whence they spread in rapid succession to Austria, Switzerland, England, and the Spanish peninsula. Subsequently they appeared in Australia and many parts of Africa, Asia, and South America. No absolute preventive or remedy is known, though some success has been attained by the use of petroleum tar and by watering the roots.

PHYSICAL GEOGRAPHY. See **Geography**.

PHYSICAL TRAINING. See **Delsarte; Gymnasium**, etc.

PHYSICK (fiz'ik), **Philip Syng**, surgeon, born in Philadelphia, Pa., July 7, 1768; died there Dec. 15, 1837. In 1785 he graduated from the University of Pennsylvania, studied medicine in Philadelphia and London, and in 1791 received a license from the Royal College of Surgeons in the latter city. During the yellow fever epidemic of 1793, in Philadelphia, he acquired a reputation as a successful practitioner, and the following year became surgeon of the Pennsylvania Hospital. His successful treatment of diseases and the introduction and improvement of numerous useful instruments caused him to be called the "Father of American Surgery." Among the honors bestowed upon him are a degree by the University of Edinburgh in 1792, the presidency of the Phrenological Society of Philadelphia in 1822, and membership in the French Academy of Medicine in 1825. He was recognized by a large number of other societies and organizations.

PHYSICS (fiz'iks), or **Physical Science**, the science that treats of the phenomena associated with matter in general, including an investigation of the laws governing these phenomena, and treating especially the relations of matter to energy. The two great branches into which the knowledge of nature is classed according to its subject-matter are designated physical science and natural science. *Physical science* is properly limited to an investigation of phenomena that are observed

in things without life, though it extends this investigation to living forms when the same phenomena are observed in a living being. *Natural science* is now limited to the study of organized beings and their development. Physics in a narrower sense is equivalent to the branches usually treated under natural philosophy, but the latter was used almost exclusively in this sense until within recent years. As now understood, physics is generally held to treat of the constitution and properties of matter—fluids, mechanics, acoustics, heat, optics, electricity, and galvanism. The changes treated in physics differ from those considered in chemistry, since a physical change is one that does not affect the composition of the molecules, hence it does not alter the specific properties of the substance, while a chemical change is one that implies a rearrangement of the atoms into new molecules and so destroys the specific properties of the substance. Dissolving sugar in water involves a physical change, while burning coal implies a chemical change.

PHYSIOGNOMY (fiz-i-ög'nō-mŷ), the art of reading character and the quality of mind by the features of the face. It is founded upon

the belief that there is an intimate connection between facial features and expression and the qualities and acts of the mind. This art was supported in the philosophy of Aristotle, who ascribed cunning, daring, bravery, ingenuity, and other traits quite largely according to the features observable in the human face. In 1586 the first authentic work on this subject was published in France by Giambattista della Porta, entitled "Human Physiognomy," in which the theories were elaborated and applied to representative cases. Sir Charles Bell published his "Essay on the Anatomy of Expression" in 1806, and may be said to be the first who gave scientific study to facial expression as related to the changes of the countenance and the muscles which produce them. Many representative writers who gave thought to psychical subjects in the last century, including Spencer and Darwin, correlated physical action with psychical states. Pieter Camper (1722-1789), the eminent anatomist of Holland, wrote "Discourse on the Face" and Johann Gasper Spurzheim published "Physiognomy in Connection with Phrenology." See **Phrenology**.

PHYSIOGRAPHY (fīz-ī-ōg'rá-fy), the science which treats of the physical features of the earth's exterior, including the physical movements or changes on the earth's surface. The scope included in this science embraces climate, life, and temperature and considers the currents of the ocean and the atmosphere. In a wider sense it may be said to cover the whole subject of physical science, since it considers the important phases of botany and zoölogy and includes the elements of astronomy, chemistry, geology, physical geography, and physics. The term is used interchangeably with physical geography in some instances, since it investigates and explains the origin of existing physical features.

Physiography classifies the natural divisions of land and assigns causes for their general outline and differences in elevation above the sea. The forms of the lands are undergoing changes from time to time, since the bottoms of the oceans are being depressed, the continents are eroded, and changes are taking place in the plains, plateaus, and mountains. In many places the rocks that lie above the sea are disintegrating and being removed through the action of winds, rains, and streams. Glaciers and oceanic waves and currents cause important changes, while islands and other forms of land are acted upon by the action of rivers, which cut embankments in some localities and build land masses in others. Both plant and animal life is influenced materially by climate and soil. These phenomena are investigated both as to source and result. The distribution of life upon earth, the agencies that tend to promote growth, and the barriers that obstruct development are all considered in their phases and relations.

The barriers that interfere with the spread of

life include the ocean, mountains, deserts, and regions of extreme cold. It is apparent that the polar zones are unsuited for the propagation of life, while barren deserts are likewise a limiting influence, though the presence of valuable minerals in some cases favor habitation. Rugged mountains that reach above the snow line, such as the Alps of Europe, interfere with the spread of life, but furnish a refuge from invasion and in some localities contain mineral wealth sufficient to attract a population that otherwise would be impossible. On the other hand, localities of favorable climate and great fertility induce density of population, such as the favored districts of Western Europe, the valley of the Nile, and the islands of Japan, though such regions are in many cases favored by being located where commerce and manufacturing enterprises can be centered with more than ordinary convenience. Locations at certain altitudes above the sea influence more or less favorably as to climatic conditions, but latitude is equally important, as may be seen from the fact that the more powerful races and nations are confined to the temperate regions.

The configuration of the sea bottom and the depth of the ocean, their causes and influence upon animal and vegetable life, are subjects investigated by this branch of study. They determine to a large extent the oceanic routes of travel and the location of commercial and industrial cities. Though formerly the great centers of trade were located almost entirely upon navigable waters, chiefly inlets from the ocean, the construction of highways, canals, and railways, all resulting from the development of civilization, have tended to spread the habitations of man to the most remote parts of the interior of continents.

PHYSIOLOGY (fīz-ī-ōl'ō-jy), the science which treats of the functions and properties of living matter. It is divided into human, animal, and vegetable physiology. Histology, anatomy, hygiene, and chemistry are allied studies, since physiology as a science is dependent in a large measure upon the progress made by the student in these related branches. *Histology* considers the minute structures of the tissues as made known by microscopic studies; *anatomy* treats of the number, structure, and connection of the parts which make up an individual being; *hygiene* is the study of the conditions most favorable for healthful action of the several parts and of the whole; and *chemistry* embraces the study of the nature and properties of every object accessible to man.

LIFE AND GROWTH. *Human physiology* treats of the processes or changes that take place in the organs and tissues of man. The human body develops from a minute cell or ovum called the *embryo*, which consists of a mass of protoplasm containing the germinal vesicle as a nucleus. The smallest known masses of living matter assume the spherical form and are known

as the *cells*. These have a soft, colorless appearance and in the living state consist of structureless material, found by microscopic examination to have slow movements. Protoplasm, consisting of a transparent material, is the life principle and is constituted of carbohydrates, fats, proteids, and water. The functions of granules and nuclei found in the protoplasm are not known definitely, but the protoplasm itself has the power to grow, absorb, move, excrete, secrete, and multiply. It is most easily studied in the simplest of animal life, particularly in the amoeba, a protozoan having a simple protoplasmic body with a nucleus and nucleolus, and effecting movement by the extension of parts of the body. These animal forms constitute the lowest living beings, while mankind is the highest form.

CELLS AND TISSUES. Each living cell is capable of receiving material different from itself as food, though this material must be in a state of fine division, and chemical and physical changes take place until it becomes a part of the cell itself. In this manner the material acquires properties and powers not before possessed by the food. While this growth of cells is much more minute, it is similar to the growth of tissues, of organs, and of the body itself. If a cell receives food material in excess of its wants, or if it has grown to maturity, then new living cell centers begin to form. The new cells have the same tendencies and properties possessed by the parent cells and the rapidity with which tissues, organs, and the body receive new cell formations determines growth; in other words, growth consists of the addition of cells.

Both in the living cell and in the living body there is a ceaseless internal motion and change in material. Old or used materials are removed without intermission, although this ceaseless process is not rapid. On the other hand, new materials are constantly taken in and changed and modified in the organism, and these finally enter into its structure. When changes in the cells or tissues discontinue, local death results, and when changes cease in the entire organism death ensues. Each individual being possesses in its organism a controlling force, usually called the *germ force*, or the *vital force*. This is transmitted from generation to generation, but is modified largely by external and internal conditions. In all the higher types of animals there are five principal tissues—blood, epithelium, connective tissue, nervous tissue, and muscular tissue.

ORGANS AND FUNCTIONS. The physiology of the different organs of the body is discussed along with the anatomy of such organs in different articles, and it is necessary in this article to call attention only in a general way to the more specific connections between them. The skeleton is constituted of the bones, which serve to protect the delicate organs of the body, to act as levers for the production of motion by

the muscles, and to give general form to the body. The skeleton determines the height and breadth of the body. It has 208 separate bones, which are held together, so as to act with the greatest nicety, by the flexible bands called *ligaments*. The bones are constructed with the view of supplying the particular wants in providing strength, rapidity of movement, and surface for the attachment of muscles, by being either solid, hollow, or enlarged at the ends. The skeleton is surrounded by the flesh, which consists of about 500 distinct fleshy masses, called *muscles*, and their size, form, and arrangement depend upon the outline of the skeleton. Motion is produced by the expansion and contraction of muscles when acting upon the bones, and all are held in place by a whitish connective tissue. However, there are some muscles that are not under the control of the will, such as those of the heart, where the motion is said to be involuntary. The muscles are covered by the skin, a tough, close-fitting garment for the protection of the tender flesh. The skin is elastic, thus being adapted to respond to every motion of the body, and not only preserves its delicacy and smoothness by oiling itself, but when worn out is rapidly replaced by a new growth.

Living matter of animal bodies is constituted essentially of the six approximate substances classified as water, salts, fat, proteid, carbohydrate, and oxygen, the three most important constituents being nitrogen, carbon, and oxygen. About forty per cent. of the weight of the body of an adult is made up of muscles, and fifteen per cent. of the skeleton. About 65 per cent. of the whole is water. The blood permeates every part of the body and directly or indirectly nourishes all the tissues. It removes such materials as are not available for further use by carrying them to the excretory organs. The heart is the great central engine that propels the blood, sending it out through the arteries, whence it passes through the capillaries into the veins. These organs convey it to the lungs to be purified and the red oxygenated blood is passed into the circulation. To maintain animal life it is necessary that carbonic acid be continually excreted and oxygen be absorbed. These processes are effected by respiration, *inspiration* carrying the fresh air laden with oxygen into the lungs, where it is taken up by the blood, and *expiration* carrying off the impurities of the body. This necessary function of the body is aided by the skin giving off waste matter through the sweat glands and taking in oxygen, while the kidneys filter the blood and separate from it matters which are foreign or useless. The glands separating fluids from the body are sac-shaped cavities.

Among the principal waste products of the body secreted by glands are the sweat and urine. The fluids vital in the process of digestion include the saliva, gastric juice, pancreatic juice,

bile, and intestinal juice. The human brain is the center of impulse of the elaborate nervous system and controls and guides the voluntary and involuntary muscles. It is the central organ that directs all movements, and is the seat of the special senses, the taste, touch, smell, sight, and hearing. Each of these senses has a special organ connected with the brain by a particular nerve. The nervous system as a whole conveys to the mind sensations by which it obtains a knowledge of the external world and of the feelings and acts of the body.

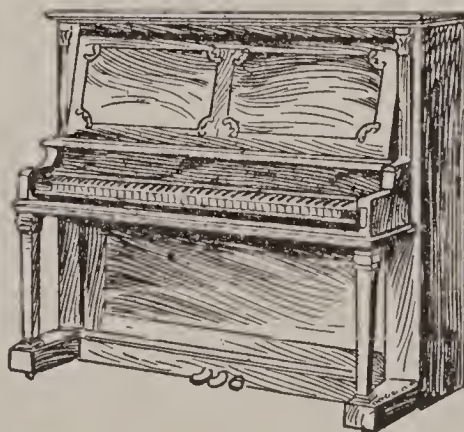
FOOD AND NUTRITION. Since the body is constantly giving off waste matter, it is necessary that fresh material be supplied in sufficient quantities. Man would starve within a few days if a constant supply of food materials was not provided, since all the available flesh of the body would be consumed by the oxygen. Different kinds of food must be selected with the view of supplying the various needs of the body, and the time for supplying the food material should be adjusted at proper intervals, otherwise nutrition may not supply the living body with material at the proper time. Digestion is dependent upon the action of the mouth, teeth, tongue, pharynx, esophagus, stomach, and intestines. The food is chewed and mixed with saliva in the mouth, whence it passes through the pharynx and esophagus into the stomach, where it is acted upon by the gastric juice and subjected to the churning motion of the stomach, thus promoting the digestion of the proteids and starchy foods. The mucous coat of the stomach is provided with multitudes of glands, which secrete the gastric juice, a colorless and watery fluid with a sour taste and odor. From the stomach the food passes through the pylorus into the duodenum, where it receives the bile and pancreatic juice and is converted into chyle, a mass with a milky appearance. It next passes through the small intestine, an intricately folded tube about 25 feet long, is acted on by the intestinal juices, and the nutritive portions are absorbed by the lacteal glands. The movement forward in the small intestine depends upon its peristaltic action, a successive wavelike contraction extending gradually from the upper to the lower part of the canal.

The blood vessels of the alimentary canal absorb the nitrogenous foods and form the portal vein, which goes to the liver, then by means of the hepatic vein it is taken to the ascending vena cava to form a part of the circulating fluid. Nutriment is also taken by the lymphatics, which unite in the thoracic duct, and is conveyed by capillary attraction to the vein under the left collar bone, whence it passes into the left innominate vein and is carried into the circulation. The entire process of digestion re-

quires from two to four hours, this depending on the class of food taken into the body. Digestion is a process of great complexity as compared to the processes of circulation, respiration, and other functions of the body.

PIACENZA (pē-à-chěnt'sà), a city of Italy, capital of the province of Piacenza, 43 miles southeast of Milan. It is located on the Po River, near its confluence with the Trebbia, and is surrounded by a fertile farming and fruit-growing country. The streets are broad and regularly platted. It has a fine cathedral founded in the 11th century and contains a number of attractive palaces and school buildings. Gas and electric lighting, waterworks, sewerage, and a public library are among the municipal improvements. Communication is furnished by several railways and a system of electric lines. The manufactures include hats, cotton and woolen goods, pottery, wine, and machinery. In the vicinity are extensive marble quarries. Piacenza was known as Placentia to the ancient Romans, who founded it in 219 B. C. It belonged to the Lombard League in the 12th century and later was joined to Parma to form a duchy for the Farnese family. Population, 1916, 36,946.

PIANOFORTE (pī-àn'ō-fōr-tā), or **Piano**, a stringed musical instrument, the sounds of which are produced by blows from *hammers*. The hammers are covered by felt and are moved by levers, being attached to a series of *keys*, which form the *keyboard*. This instrument is



UPRIGHT PIANO.



FLORENTINE GRAND PIANO.

probably the most extensively used musical device in the world. Although of comparatively recent date, it may be said to constitute the perfected form of all the ancient instruments which employed strings that were struck by hammers, particularly of the harpsichord and clavichord. The original pianofortes had strings placed in a small and portable box, on which the operator played by striking them with a hammer held in the hand. It was called the *dulcimer* in this form and is still used in many countries of Europe and Asia. The *clavichord* was an improvement over the dulcimer, in that the strings were plucked with quills. It was eventually superseded to a large extent by the *harpsichord*

an instrument with a more extended compass and often with two or more manuals. The earliest form of the pianoforte was made in the early part of the 18th century and was in many respects inferior to the harpsichord, but it contained the elements by which it could be expanded and from it resulted the modern grand pianoforte.

The instruments of modern construction must necessarily have a heavy frame, since a large number of strings are to be stretched, and these cannot be kept in tune unless the frame is heavily timbered or made largely of cast iron. Strings were made originally of steel wire for the upper tones and of brass wire for the lower tones, but modern instruments have strings wholly of steel wire. The strings pass over a series of bridges, rising from the sounding board, and the tones depend upon their size and length. Long and large wires supply low tones, while the short and fine are used for the higher tones. Wires for the lower tones are usually made of steel with a double wrapping of fine brass or copper wires. Two common forms of pianofortes are in general use, the *grand piano* and the *upright piano*. The strings in the grand piano lie in the direction of the keys, and in the upright piano the strings are stretched vertically perpendicular to the keys. The grand pianos of modern structure are made with six, seven, or more octaves. As a rule, the larger instruments are used in concerts, since they supply the necessary compass and strength and furnish every gradation of sound. The *electric piano* was invented by Dr. Eisenmann, of Berlin, in 1891. This instrument is played automatically by means of an electric current. Another recent invention, the *pianola*, is designed to play the pianoforte automatically. It is attached to the instrument and works upon the keys by means of compressed air, a perforated roll of paper limiting the time of each note struck.

PIASTRE (pī-ās'tēr), or **Piaster**, a coin used in a number of countries in Europe and Asia. The piastre of Spain is about equal to our dollar. In Italy the government patterned after Spain in coining the piastre, but the value is only about 89 cents, while the piastre of Turkey is a little less than five cents. The piastre used in Egypt has a value of about five cents. In a number of South American states the name is applied to money, but the value differs somewhat.

PIATT (pī'ăt), **John James**, poet, born in Milton, Ind., March 1, 1835. He began his career in a printing office and subsequently studied at Kenyon College and Capital University. Subsequently he did newspaper work in Louisville and Cincinnati, was chosen librarian of the House of Representatives in 1871, and was United States consul at Cork and Dublin, Ireland, from 1892 to 1893. His first verses were written in conjunction with W. D. Howells in a volume entitled "Poems of Two

Friends." Among his volumes of poetry are "Western Windows," "Poems in Sunlight and Firelight," "Idyls and Lyrics of the Ohio Valley," "At the Holy Well," and "Landmarks and Other Poems." His wife, Sarah Morgan Piatt, born in Lexington, Ky., Aug. 11, 1836, also wrote a number of poems. The volume entitled "Nests at Washington" was written in connection with her husband and in 1894 she published "Collected Poems." He died Feb. 16, 1917.

PIBROCH (pē'brök), a form of music played on the bagpipe, which includes marches and dirges. The martial character of this music has a powerful effect in arousing the military spirit, especially among some of the people of Asia, but the rhythm is irregular and difficult to learn, since the scale of the bagpipe contains sounds unrepresented by any notation.

PICAYUNE (pīc-ā-ūn'), a word derived from the language of the Caribs and applied to a small Spanish coin which was current in the United States until the Civil War. The value was six and one-fourth cents and it was called *sixpence* in the Northern States. The word picayunish, meaning small and paltry, was derived from it.

PICCOLOMINI (pēk-kō-lō'mē-nē), **Ottavio**, Duke of Amalfi, born at Siena, Italy, in 1599; died in Vienna, Austria, Aug. 10, 1656. He descended from a distinguished family, which is noted because of supplying one of the popes, Pius II., several cardinals, and a number of writers and warriors. He entered the military service of Spain, but later was sent to aid Ferdinand II. of Germany in suppressing the Bohemians, in 1621, and bore an important part in the Battle of Weisseberg. In 1632 he was at the Battle of Lützen, and historians generally recount that his regiment fired the shot which killed Gustavus Adolphus. Subsequently he operated with Wallenstein in Bohemia and aspired to the Bohemian throne, for which reason he was instrumental in causing the fall of that distinguished general. In 1635 he had charge of the Spanish forces in the Netherlands, commanded in Sweden in 1648, and in 1649 became a field marshal under Emperor Ferdinand II. Soon after he was honored by the King of Spain, who conferred upon him the Order of the Golden Fleece. Piccolomini was an eminent commander of the period in which the great contest for religious supremacy waged in Europe, and was one of the most pronounced of the Catholic advocates.

PICKENS (pīk'ēnz), **Andrew**, soldier, born at Paxton, Pa., Sept. 13, 1739; died Aug. 17, 1817. He removed with his parents to South Carolina in 1752, where he fought under General Grant against the Creeks and Cherokees. At the beginning of the Revolution he entered the service as a captain, was soon promoted to the rank of brigadier general, and received honorable mention for resisting an overwhelming number of British. In 1779 he defeated a

force of Tories at Kettle Creek, commanded at the Battle of the Cowpens, and received a sword from Congress in recognition of valiant service. After the war he served as a member of the Legislature, was elected to Congress in 1792, and retired from public life in 1812. During his political life he concluded many treaties with the Indians.

PICKENS, Francis Wilkinson, statesman, born at Togadoo, S. C., April 7, 1805; died Jan. 25, 1869. He studied at South Carolina College and took up the practice of law. In 1832 he was elected to the State Legislature, where he was prominent as an advocate of nullification and of states' rights. He served as a member of Congress from 1834 until 1844 and was prominent in the councils of the Democratic party. In 1857 he was made minister to Russia, but returned to the United States in 1860, and was soon after elected Governor of South Carolina. He was a strong sympathizer in the cause of the Confederate States, and was foremost in demanding the surrender of Fort Sumter and all Federal property within the State of South Carolina.

PICKERING (pĭk'ēr-ĭng), **Edward Charles**, astronomer, born in Boston, Mass., July 19, 1846; died Feb. 3, 1919. He graduated at Harvard in 1865 and the next year became instructor in physics at the Massachusetts Institute of Technology. The United States government sent him to Iowa in 1869 to witness an eclipse of the sun. His observations were published in the United States *Nautical Almanac*. The following year he made a similar mission to Spain. In 1876 he became professor of astronomy at Harvard, and while engaged at that institution aided in founding an auxiliary observatory at Arequipa, Peru. He was given many distinctions because of his astronomical discoveries of value, including an election as associate to the Royal Astronomical Society of London and membership in the National Academy of Sciences of America. He published "Elements of Physical Manipulation," and edited William von Bezold's "Theory of Color in Its Relation to Art and Art Industry."

PICKETT (pĭk'ēt), **George Edward**, soldier, born in Richmond, Va., Jan. 25, 1825; died in Norfolk, Va., July 30, 1875. He completed the course of study at the West Point Military Academy by graduation in 1846, soon after entered the army as brevet second lieutenant, and took part during the Mexican War at Vera Cruz, Contreras, and Chapultepec, receiving a captaincy for gallantry at the last named battle. After the close of the Mexican War, he served on garrison duty, and in 1861 resigned his commission and entered the Confederate army as colonel. He served with distinction on the Rappahannock River, was severely wounded at Gaines's Mill in 1862, and after recovery was promoted to the rank of major general. Later he commanded with General Lee at Fredericks-

burg and Gettysburg, and in 1864 prevented the capture of Petersburg by Gen. B. F. Butler. In 1865 he commanded at Five Forks and, after being routed, surrendered with General Lee.

PICKFORD, Mary (Mrs. Owen Moore), actress, born in Toronto, Ont., April, 8 1893. She began to appear on the stage at the age of five years under the direction of her mother, who was an actress. Her greatest successes were in motion pictures and she became known throughout America. She starred in "Rebecca of Sunnybrook Farm," "A Girl of Yesterday," "Poor Little Rich Girl," and other well known moving picture plays.

PICKLES (pĭk'k'lz), the general name of many kinds of preserved articles of food. The term is applied in particular to different kinds of fruits or vegetable preserved in vinegar, but in a wider sense includes animal substances preserved in salt or brine, such as fish, beef, pork, and mutton. Pickles made of vegetables are eaten as a condiment. They are steeped or par-boiled in brine and then transferred to the vinegar, to which salt, mustard, horse radish, and various spices may be added.

PICRIC ACID (pĭ'krik), an organic dye obtained by treating phenol with strong nitric acid, or by dissolving carbolic acid in sulphuric acid and then adding nitric acid. It crystallizes in scaling crystals, or needles, and is soluble in ether, alcohol, benzol, and sulphuric and nitric acids. The taste is very bitter. Formerly it was used very extensively in dyeing silk and wool and the use of it for this purpose is still considerable, but at present it is employed largely in the manufacture of gunpowder and other explosives. In some countries it is used as a substitute in the manufacture of beer and for many purposes in medicine, especially as a remedy for burns.

PICTS (pĭkts), the race of people who inhabited the northern part of England and the eastern part of Scotland at the time of the Roman occupation. They appear to have come in conflict with the Romans about 296 A. D. and were associated by Roman writers with the Caledonians. Little is known of the language of the Picts, though they are generally regarded of Celtic descent. In 850 the Scots, whose original seat was in Ireland, subdued the Picts and became the predominating influence in Scotland. Remains of architectural structures erected by the Picts have been found in many places in the northern part of Great Britain.

PIDGIN, Charles Felton, author and inventor, born in Roxbury, Mass., Nov. 11, 1844. After attending the schools of his native State and receiving an academic education, he conducted a mercantile business in Boston from 1863 to 1873 and in the latter year was made chief clerk of the Massachusetts Bureau of Statistics of Labor. His inventions include an addition register, an automatic multiple tabulating machine, an electrical adding and multi-

plying machine, and a self-counting tally sheet. Besides contributing to periodical literature, he published about sixty songs and wrote a number of musical comedies and cantatas. His publications include "Blennerhasset, or the Decree of Fate," "Quincy Adams Sawyer and Mason's Corner Folks," and "Practical Statistics."

PIEDMONT (pēd'mōnt), the most northwesterly principality of Italy, surrounded by France, Switzerland, Lombardy, and Liguria. It is so named because of its situation at the foot of the Alps, *pied* meaning foot and *mont*, mountain. The area is 11,295 square miles. The Po River and its tributaries supply an abundance of drainage. The soil is generally fertile and the climate is healthful. It constitutes one of the most productive parts of the Italian kingdom. Turin is the principal city. Population, 1917, 3,423,854.

PIEDMONT PLAIN, the name applied generally to the region of the United States which lies between the Atlantic coast plain and the Appalachian Mountains. It is narrow and not clearly defined in the New England states, but broadens southward, forming a plain 300 miles wide in North Carolina. The surface is more rugged and eroded with valleys than the low coastal plain, and between the two is a definite line of escarpments known as the *Fall Line*, which indicates where the streams lose their current and merge into estuaries. The Piedmont Plain is an older formation than the coastal plain and contains harder strata of rocks.

PIERCE, Franklin, fourteenth President of the United States, born in Hillsboro, N. H., Nov. 23, 1804; died in Concord, Oct. 8, 1869.



He was the fourth son of Benjamin and Anna Pierce, and his father was distinguished as a brevet major of the Revolution. He secured an academic education at Exeter, entered Bowdoin College as a classmate with John P. Hale, and graduated as third in his class in 1824. Soon after he undertook the study of law

at Portsmouth and Amherst and was admitted to the bar in 1827, when he began a successful practice in his native town. He was an influential supporter of Andrew Jackson and became a member of the State Legislature in 1829, serving four years consecutively. In 1834 he married Jane Appleton, daughter of Jesse Appleton, president of Bowdoin College, and in 1837 became a member of the United States Senate. He resigned his seat in 1842 to resume the practice of law at Concord, and in 1846 enlisted as a private for service in the Mexican War, but was soon after

commissioned colonel and later brigadier general of volunteers.

Pierce joined the army under General Scott at Puebla, in 1847, and accompanied it to undertake the capture of the city of Mexico. He was highly complimented by General Scott for bravery in the battles of Contreras and Churubusco, and participated in the Battle of Molino del Rey and other engagements until the war closed. In 1848 he resumed the practice of law in Concord, and the Legislature of the State in the same year voted him a sword of honor for distinguished services in the war. He was chosen a member of the State constitutional convention in 1850, became its president, and favored removing the property qualification required for voting and the religious test by which Roman Catholics were disqualified from holding office in the State. The Democratic convention held at Baltimore in 1852 nominated him for President, and in the election that followed he received 254 electoral votes, while General Scott, the opposing candidate, received only 42 votes. His administration was distinguished by the passage of the Kansas-Nebraska Bill, which in effect repealed the Missouri Compromise, by the making of a treaty with Japan, and by the agitation of the Nicaraguan affair. He was unsuccessful in securing a second nomination, though his personal friends supported him with much ardor. Upon the expiration of his term he spent three years in Europe, and, on returning to America, retired to his home at Concord, where he resided the remainder of his life.

PIEROLA (pē-ā-rō'lā), **Nicolas de**, soldier and president of Peru, born in Arequipa, Peru, Jan. 5, 1839. He studied in private academies and the university of his native city, and later became a member of the bar. After establishing a successful law practice, he interested himself in political affairs and in 1869 became minister of finance. The political complications that existed caused him to be impeached at the end of his administration, and after being acquitted he went as an exile to Chile. He organized unsuccessful expeditions against the Peruvian governments in 1874 and 1877, and, when war began with Chile, he offered his services to the president of Peru, General Pardo, but they were not accepted. Later the president retired and Pierola became commander in chief of the Peruvian forces, but retired from the government in 1882. He visited the United States and Europe in the same year and later settled in his native city. Though nominated for the presidency in 1894, he was defeated. The following year the Cáceres government was overthrown and Pierola was elected to the presidency.

PIERRE (pēr), the capital of South Dakota, county seat of Hughes County, near the central part of the State, on the Missouri River. It is on the Chicago and Northwestern Railroad,

on a fine site near Old Fort Pierre, at the mouth of the Bad River. The noteworthy buildings include the State capitol, the county courthouse, the high school, and many churches. It has a government industrial school for Indians and is the seat of the Pierre University, a Presbyterian institution. The surrounding country has large farming and stock-growing interests. Among the industries are machine shops, grain elevators, and stock yards. Waterworks and electric lighting are among the public utilities. Pierre was settled in 1880 and incorporated in 1890. Population, 1905, 2,794; in 1920, 3,209.

PIERREPONT (pēr'pōnt), **Edwards**, jurist, born in North Haven, Conn., March 4, 1817; died Sept. 23, 1892. He graduated at Yale University in 1837, completed the course of law of that institution in 1840, and soon after established a successful practice in New York City. In 1857 he became judge of the superior court and in 1862 was appointed to try cases of parties confined in the prisons and forts under the United States government. He supported Abraham Lincoln for the Presidency, though he was a Democrat, and afterward prosecuted the trial of J. H. Surratt, one of the conspirators implicated in the assassination of President Lincoln. From 1869 to 1870 he was district attorney-general in New York and in that capacity was an active opponent of the Tweed ring. President Grant selected him as Attorney-General in 1875, but in 1876 he resigned to become minister to England. Pierrepont was a jurist of eminent ability and prepared many able writings on international law. The University of Oxford, England, granted him a degree and he was similarly honored by other prominent institutions.

PIETERMARITZBURG (pē-tēr-mâr'its-bûrg), a city of South Africa, capital of Natal, situated in a fertile plain, on a tributary of the Umgeni River. It is conveniently connected with several seaports and inland cities by railways. The city has a growing trade and contains a number of fine public buildings. Among the features are the townhall, the colonial capitol, the botanical gardens, and the central railway station. The city was founded by the Boers and was so named from Pieter Retief and Geert Maritz. Population, 1921, 29,347.

FIG. See **Swine**.

PIGEON (pīj'ūn), a group of rasorial birds which are typified by the familiar domestic pigeon. Although widely distributed, they are most abundant in the tropical countries. They include many species, varying greatly in color and habit. Some writers call them *doves* and ordinarily the terms are used interchangeably. The crop is quite large in most species and the bill is hard, with the upper mandible slightly curved at the point. Pigeons have quite large wings and are strong in flight. They perch in trees, but prefer to build their nests on some other elevated objects. The domestic pigeon

breeds in barns or in houses specially constructed for them, where their familiar cooing may be heard most frequently. Both male and female sit on the eggs and they appear to pair for life. Among the familiar species are the *stock*, *carrier*, *pouter*, *tumbler*, *house*, *jacobin*, *fantail*, and *runt* pigeons. The *passenger pigeon* of North America was formerly met with in large numbers, but the excellent quality of its flesh caused hunters to search for it with great eagerness and it is now less common. It has



PASSENGER PIGEON.

a grayish blue color, somewhat deeper on the head than on the body, and the tail feathers are dusky. Grain, berries, and the tender parts of plants comprise the chief food. It nests in the branches of trees. Pigeon culture is an important industry in many countries, especially in India, China, Persia, Belgium, and Holland. The domestic pigeon is believed to be a descendant from the rock dove. It is reared both for its eggs and its flesh, but particularly for the latter. See **Carrier Pigeon**.

PIGMENTS (pig'ments), the coloring materials used in painting and dyeing. They are partly artificial and partly derived from the three kingdoms of nature. The principal kinds of coloring substances are obtained from the mineral kingdom, and mineral coloring matters are usually added to substances derived from animals or vegetables. Most coloring substances used in painting are insoluble and are ground and applied after mixing them with oil or some other liquid, the liquid drying after application without changing the pigments. The modes of painting are named from the vehicle and method used in applying the coloring substances, as *oil colors*, in *distemper*, in *water colors*, and in *fresco*.

Many of the available pigments are native colored earths, as ocher (q. v.). Others are separated from metallic compounds and several kinds of mineral substances, and a large number are prepared artificially from inorganic sources. *Lakes* are prepared from animal and

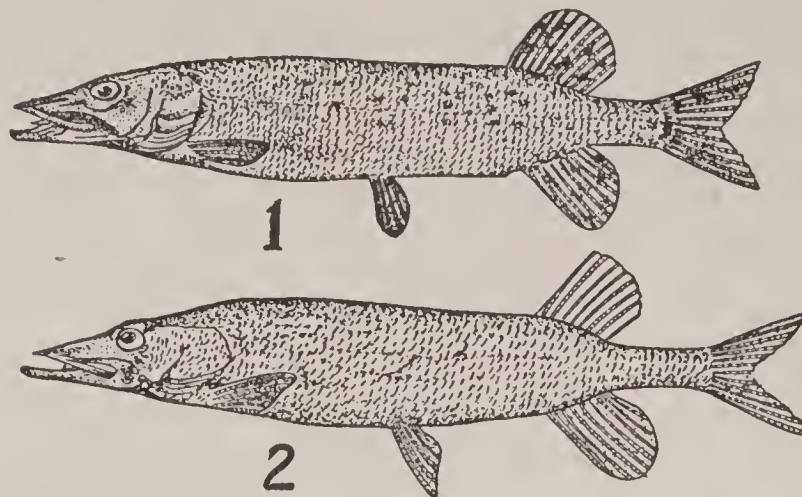
vegetable coloring matters mixed with earthy bodies, and *dyestuffs* are obtained artificially from organic substances. A material used in painting should spread in a uniform coat over the surface, offer resistance to the change and action of weather, dry with reasonable quickness, and possess the property of forming an opaque covering over the surface on which it is spread. In preparing coloring substances for artistic work it is necessary to use better material and grind it to a much greater fineness, for the reason that products made by it need to possess an unalterable tone after long exposure. The substances used for staining glass and porcelain are metallic and possess the property of remaining unchanged when heated.

PIGWEED, or **Goosefoot**, the name of many plants which belong to the *Amarantus*, a genus of plants native to the tropical and temperate countries. About 100 species belong to the Amaranth family, which includes a number of annuals grown in gardens, such as *prince's feather*, *cockscomb*, and *love-lies-bleeding*. The common pigweed was brought from Europe to Canada and the United States. This species is an obnoxious weed in gardens and fields. It has small greenish flowers on spikes, dull green leaves, and a straight stem. Locally it is sometimes called *beetroot*, since its root has a reddish color. It requires careful cultivation to clear the soil of this weed.

PIKA (pī'kà), the name of several rodent animals, frequently called *conies* or *calling hares*. They have short ears and no visible tail. The skull is very flat and dilated behind and the legs are short. In most respects they resemble the guinea pigs rather than the hares, but like the latter are timid and harmless. Several species are common to high mountains, including the *Rocky Mountain pika* of America. This animal is about seven inches long and subsists on grasses, which it cuts and stores for fodder in the winter. The pika is hunted for its skin and meat.

PIKE, a genus of fishes found in the fresh waters of Europe and North America, so called from the sharp snout and slender shape. Most species have a long body and flat back, and taper toward the tail with more than ordinary abruptness. Cycloid scales cover the body. The mouth is large, with the lower jaw projecting, and there is a large and powerful array of teeth. The dorsal fin is near the tail, by which it is aided in swimming with greater swiftness than any of the fishes. The *common pike* found in the rivers and lakes of North America occurs likewise in Europe and Asia and is of much value for its edible flesh. It rarely exceeds three feet in length and weighs from six to twenty pounds. The largest species of pikes attain a length of from three to six feet and live to a very old age. Specimens have been found in which the age was estimated at 250 years. Pikes are very voracious and feed

on almost any animal substance that they are capable of swallowing. The *pike perch* is allied to the perch, but resembles the pike in having a long head and body. It occurs in the Great



1. PIKE. 2. PICKEREL.

Lakes and many of the streams of the Mississippi valley, where it is caught as a favorite food fish.

PIKE, Albert, author and soldier, born in Boston, Mass., Dec. 29, 1809; died in Washington, D. C., April 2, 1891. He was trained specially for school teaching and taught successfully at Newburyport and Fairhaven. In 1831 he engaged in journalism at Fort Smith, Ark., where he secured the ownership of the *Arkansas Advocate* in 1834. He discontinued journalism in 1836 and engaged in revising the statutes of Arkansas. At the beginning of the Mexican War he entered the service as cavalry captain, and during the Civil War commanded the Indian allies of the Confederates. He became editor of the *Memphis Appeal* in 1867, but removed the following year to Washington, where he engaged in the practice of law until 1880. His writings include a large number of excellent poems and authoritative works on law and Masonry. His principal publications are "Hymns to the Gods," "Ode to the Mocking Bird," "An Indian Romance," "Statutes and Regulations," and "Prose Sketches and Poems." Harvard University bestowed a degree upon him in 1859.

PIKE, Zebulon Montgomery, soldier and explorer, born at Lamberton, N. J., Jan. 5, 1779; died April 27, 1813. He accompanied his father to Pennsylvania, under whom he became a cadet in a regiment, but was promoted to the rank of first lieutenant in 1800. In 1805 he started for Saint Louis to aid in exploring the Louisiana Purchase. Soon after he set out for a tour through the southwest, when he penetrated as far as the Rio Grande, where he was imprisoned by the Spaniards, but was soon after released. He was rapidly promoted, becoming major in 1808, and in 1813 commanded an expedition sent against York (now Toronto), Canada. He was killed in action while making an assault upon the place.

PIKE PERCH, the name of a genus of perches found in Europe and America. A num-

ber of species have been described, all of which resemble the pike in that they have an elongated body and snout. The *common pike perch* of North America is widely distributed in the waters of Canada and the United States, and locally is known by the names of *wall-eyed pike*; *dory*, *yellow*, or *blue pike*; and *jack salmon*. It is caught in nets and by angling. In size it is usually less than two feet in length, but sometimes reaches three feet and weighs twenty pounds. Another species is the *sauger* or *grey pike*, which is found in the Great Lakes. The body is cylindrical in form and has fins spotted with white.

PIKE'S PEAK, an elevated summit of the Rocky Mountains, situated in Colorado, near Colorado Springs. It was discovered by Gen. Z. M. Pike, in 1806, while making explorations to find the source of the Mississippi. The mountain is rich in gold deposits, has a meteorological observatory, and is 14,134 feet high. Numerous lakes are within its vicinity. A mountain railway was built to its top in 1891, which has a length of nine miles and connects with Manitou Springs, a noted summer resort near its base.

PILATE (pī'lāte), **Pontius**, fifth Roman procurator of Judaea, who succeeded Valerius Gratus to that position in 26 A. D. He was a Roman *eques* by rank and had his residence as procurator at Caesarea, but during festivals visited Jerusalem, where he presided over various bodies as official. Writers generally agree that Pilate was alike indifferent to justice and mercy, and that he was narrow-minded in the administration of the law. When the Jewish priests had condemned Christ to be executed, they took him to Pilate, for the reason that the power to inflict capital punishment was not vested in them. Though Pilate protested the innocence of Christ, he permitted the Jews to crucify him, but afterward consented that his body be buried by Joseph of Arimathea. It is not certain what became of Pilate, but the best authorities indicate that he was removed from office in 36 A. D. and banished to Vienna by Caligula. According to tradition, Pilate afterward committed suicide. Pilate's wife was a secret disciple of Jesus and is commemorated as a saint in the Greek Church.

PILCHARD (pīl'chērd), a fish of the herring family. It is about as large as a herring, but is somewhat thicker and the scales are larger. Young pilchards are known as sardines. Vast schools of the pilchard occur in the Mediterranean and the Atlantic coast of Europe, where this fish is caught by means of seines for the market and for preserving purposes. Pilchard fisheries occur on the shore of the English Channel, but not elsewhere in Great Britain. The most important fisheries are off Cornwall, where many thousands of hogsheads are taken annually.

PILCOMAYO (pēl-kō-mä'yō), a river of South America, the largest tributary of the Paraguay. The source is in the vicinity of Sucre, Bolivia. After a circuitous course of about 1,500 miles toward the southeast, it joins the Paraguay below Asunción. It forms the boundary between Paraguay and Argentina. Forests of great value abound in its valley, but its navigation is obstructed in many places by shallows during the dry season.

PILE, a post of timber or iron driven into the ground, either upon the land or under water, to serve as a foundation of any structure. The simple form of the pile consists of a straight tree, which is pointed at one end and banded at the other to protect it from the shattering effect of the blows by which it is driven downward. An iron socket is sometimes fixed to the lower end, as an aid to permit penetrating hard substances, or a metal cap in the form of a screw is adjusted, permitting it to be sunk into the muddy or sandy bottom by turning. Piles are commonly driven by machines called *pile drivers*, the action of which is the fall of a heavy block of iron raised to a considerable height by horse or steam power. Piles are used extensively in constructing dams, wharves, pikes, and levees.

PILGRIM FATHERS, the name generally applied to the Nonconformists who sailed from Southampton, England, in the *Mayflower*, and landed in the vicinity of what is now Plymouth, Mass., on Dec. 21, 1620. A party of Puritans left England in 1608 because of constant religious persecutions and settled in Holland. As they were unwilling to conform to the customs of Holland, they sent John Carver and Robert Cushman as commissioners, in 1617, to treat with the Virginia Company, then located in England, for territory in America. The whole company sailed from Delft Haven in the *Speedwell* to Southampton, where they embarked in the *Mayflower* for America on Aug. 5, 1620. It was the intention of the passengers, a total of 102, to land near the mouth of the Hudson River, but they were driven farther north by the wind. The leaders of the pilgrims were Carver, Cushman, Bradford, Brewster, and Miles Standish. A compact of government was written and signed before landing and this document is regarded the first written constitution of which there is a historical account. The pilgrims are remembered by a monument at Plymouth, by Forefathers' Day, and by a Pilgrims' Hall erected under the direction of a Pilgrims' Society.

PILLING (pīl'ling), **James Constantine**, biographer, born in Washington, D. C., Nov. 16, 1846; died in Olney, Md., July 26, 1895. He studied at the Washington Gonzaga College, secured clerical work in various committees of Congress, and in 1880 became chief clerk of the United States geological survey. In 1891 he was selected as ethnologist of the

Smithsonian Institution. His writings are devoted largely to bibliography and ethnology and include many works of superior value. Among them are "Bibliography of the Eskimo Language," "Bibliography of the Algonquian Languages," "Bibliography of the Athabaskan Languages," "Bibliography of the Iroquoian Languages," "Bibliography of the Wakashan Languages," "Bibliography of the Languages of the North American Indians," and "Catalogue of Linguistic Manuscripts in the Bureau of Ethnology."

PILLORY (pī'lō-rŷ), a wooden frame designed for the punishment of offenders and criminals. This mode of punishment was for-



PILLORY AND STOCKS.

merly of common use in England, but it was abolished there in 1837. It was employed principally for the punishment of those guilty of perjury, forgery, libel, petty larceny, and unjust weights, and for some time it was used in punishing common scolds and brawlers. The *pillory* consisted of a frame of wood, erected on a pillar or stand, and there were movable boards containing holes in which the head and hands of the offender were put. When in this position, the offender was exposed to the public view and insult, this constituting the principal punishment. Another similar implement, the *stocks*, consists of a frame of timber with holes for the feet, or the feet and hands. A modified form of the pillory is still used in a number of Asiatic countries. It was employed to a limited extent in the early English settlements of America.

PILLOW, Gideon Johnson, soldier, born in Williamson County, Tennessee, June 8, 1806; died Oct. 6, 1878. He studied at the University of Nashville, where he graduated in 1827, and took up the practice of law at Columbia.

In 1846 he became a brigadier general of Tennessee volunteers in the Mexican War, was wounded while commanding at Cerro Gordo, and took part in the battles of Molino del Rey and Chapultepec. Afterward he again practiced law, but in 1861 raised a regiment for service in the Confederate army. He commanded at Belmont against General Grant and was second in command at Fort Donelson, but left the place before it was surrendered. Afterward he operated in the southwest with General Beauregard.

PILLSBURY (pīlz'bēr-ī), **Charles Alfred**, born in New Hampshire in 1842; died Sept. 17, 1899. He settled at Minneapolis, Minn., at an early date in the history of that State, and in 1872 organized a company that built the largest flour mills in the world. These mills were sold to an English syndicate in 1889, which came into possession of the famous Pillsbury-Washburne mills, and the entire system was placed under a board of directors of which Pillsbury became president. He built many elevators and other large structures in which improved machinery was placed. The facilities installed by him for crushing and disintegrating wheat by means of steam rollers not only cheapened flour, but greatly improved its quality. Pillsbury was the owner of patents on a number of improved devices, and thereby obtained much profit. He served as a Republican in the senate of Minnesota from 1877 until 1887.

PILLSBURY, **John Sargent**, public man, born at Sutton, N. H., July 29, 1828; died Oct. 18, 1901. He received a public school education in his native State, and in 1855 removed to Minnesota to engage in the hardware business at Saint Anthony, now Minneapolis. His business proved successful, owing to the rapid development of the northwest, and he invested largely in lumber and forest interests. In 1872 he joined the firm of Charles A. Pillsbury & Co., which became owner of the largest flouring mills in the world. He served as State senator from 1864 until 1876 and was Governor of Minnesota from 1876 until 1882. Besides erecting Science Hall for the University of Minnesota at a cost of \$150,000, he founded a workingman's library in Minneapolis, and built a town-hall in his birthplace, Sutton, N. H.

PILOT (pī'lūt), an officer licensed by law to conduct vessels in and out of port, or within a particular district, designating the courses to be steered. Pilotage in the United States is controlled by Congress, but the individual states are granted power to make particular regulations. A system of this kind has been found necessary in all countries, since there are always points of difficulty and danger near the shores and where ships are to land, it being the duty of the pilot to superintend the steering of the vessel so that the dangerous channels may be avoided. In many of the large seaports compulsory pilotage has been abolished

and some of the states have greatly modified the system, though the larger insurance companies still require the employment of a pilot by a clause in their policies.

PILOT, or **Pilot Fish**, a fish which somewhat resembles the mackerel, but differing from it in having no finlets back of the dorsal fin. The adult is about two feet long, has five cross bands of black, and the general color is grayish-blue. Though not sold extensively in the markets, it is prized for its fine flavor and delicate flesh. Large numbers are associated with sharks in following vessels at sea, by which means they obtain food from the refuse thrown from the ships.

PILSEN (pĭl'sĕn), a city of Bohemia, at the confluence of the Mies and Radbusa rivers, 52 miles southwest of Prague. It is surrounded by a fertile agricultural and dairying country, which contains valuable deposits of coal and kaolin. The city has railroad facilities, good municipal improvements, excellent schools and churches, and a number of public parks. Among the manufactures are clothing, spirituous liquors, paper, leather, machinery, stoves, earthenware, and enameled tinware. Several extensive iron and glass works are in the vicinity. The celebrated Church of Saint Bartholomew was built in 1292. It was occupied by a Prussian army in 1866. The inhabitants are chiefly Germans and Czechs. Population, 1920, 81,165.

PIN, a short piece of wire, having a rounded or flattened head and a sharp point, in common use for fastening together pieces of paper and parts of clothing. Though an article of great utility, a pin represents only a small value and is of comparatively recent invention. It is probable that pins were manufactured by the ancients, but their product was made largely of bones of animals, particularly of fishes. Copper pins came into use at an early period of European history. At the beginning of the 15th century the manufacture of pins from copper, brass, and iron employed a large number of workmen, though they were made exclusively by hand. Modern pin making by machinery dates from 1824, when Lemuel W. Wright, of Massachusetts, invented a pin-making machine, which he soon after patented in America and Europe. The price of pins at once became greatly cheapened, though since then many improvements have been made. It is thought that about 2,500,000 pins are consumed daily in Canada and about 35,000,000 in the United States.

Pins are made of various materials, but most generally of an alloy composed of two parts of copper and one part of zinc. Many devices to manufacture this commodity are in use, all of which are propelled by machinery, and the machines do the work with little more than the supervision by the workman. The metal alloy is cast in bars and these are made into wire of the proper size. After winding the wire on a large reel, it is hung immediately

above the pin-making machine. This machine is supplied with a pair of pincers so adjusted that they are capable of grasping the wire and drawing it from the reel, and the machine cuts the wire into the desired length. It is next sharpened and the point is finished by a revolving cylinder having the effect of a file, and is then carried to a die that partly makes the head. The head is completed in another similar die, and from it is dropped into a box below.

After a large number of pins have been prepared in this way, they are placed in a barrel containing sawdust and revolved rapidly to remove foreign matters from their surface. When taken from the barrel they have a bright appearance and are ready to be put into paper sheets. Mechanical devices are used in papering. All the work of preparing the papers and adjusting the pins is done by the machines. A single machine is capable of making from 125 to 200 pins per minute. The color of pins depends on the kind of material used, but in some cases they are coated with tin by boiling them in weak nitric acid in which pieces of tin are placed. Pins of a black color are intended for mourning and are made from black wire and japanned, while others are made similarly but have heads of glass or porcelain.

PINCHBECK (pĭnch'bĕk), an alloy of copper and zinc, usually made to resemble some of the baser alloys of gold. It contains about twenty parts of zinc and eighty parts of copper, and is used to some extent in making watch cases and other articles in imitation of gold.

PINCHERS (pĭnch'ĕrz), a tool with two handles and two grasping jaws that work on a pivot. It is used for gripping things which are to be held fast, for cutting wire, and for drawing nails. Those used for cutting wire are called *nippers* and small pinchers are known as *pliers*. The latter are sometimes modified for punching holes in paper and leather, being constructed so one of the jaws has a hollow punch with a cutting edge.

PINCKNEY (pĭnk'nĭ), **Charles**, statesman, born in Charleston, S. C., March 9, 1758; died Feb. 22, 1824. He took up the practice of law in 1779, but was shortly after elected to the Continental Congress. In 1778 he was a delegate to the Federal convention and served as Governor in South Carolina from 1789 to 1792 and from 1796 to 1798. He was elected United States Senator as a Democrat in 1797, became minister to Spain in 1803, and served as Governor of South Carolina from 1806 to 1808. Subsequently he was a member of the State Legislature and later of the National House of Representatives. He advocated a system of free schools in his State. Pinckney was a close friend of President Jefferson.

PINCKNEY, **Charles Cotesworth**, statesman, born in Charleston, S. C., Feb. 25, 1746; died Aug. 16, 1825. He studied in South Carolina and in England, was attorney-general of

the colony of South Carolina, and became a member of its Provincial Congress in 1775. His efforts were favorable to the colonists and he became the aid-de-camp of Washington, serving with him in that capacity at the battles of Brandywine and Germantown, but soon after took charge of a command as colonel. In 1780 he was taken prisoner at the surrender of Charleston and was detained by the British until the war closed. He was a member of the Federal convention in 1787 that framed the Constitution of the United States, and in that body opposed making religion a test of qualification for office. President Washington appointed him minister to France in 1796, but the French directory refused to receive him, since a war was threatened at that time between France and the United States. However, the French made a proposal to avert war in case the United States would make a monetary payment, when Pinckney replied, "Millions for defense, but not a cent for tribute." He was soon after appointed major general and was the unsuccessful candidate of the Federalist party for Vice President in 1800 and for President in 1804 and 1808.

PINCKNEY, Thomas, soldier and diplomat, born at Charleston, S. C., Oct. 23, 1750; died Nov. 2, 1828. He studied law in London, England, and joined the Revolutionary army on returning to America. At Camden he was severely wounded, in 1780, and remained a prisoner until the close of the war. In 1787 he was elected Governor of South Carolina and in 1792 became minister to England. He was sent to Spain in 1794 to negotiate a commercial treaty, which resulted in concluding, in 1795, the agreement that navigation on the Mississippi was to be free to the United States. In 1796 he was the Federalist candidate for Vice President. Later he served a term in Congress and commanded as major general in the War of 1812. At the Battle of Horse Shoe Bend he defeated the Creek and Seminole Indians.

PINDAR (pīn'dār), celebrated Grecian lyric poet, born near Thebes in 522 B. C.; died in 442 B. C. He descended from a noble family, and under the direction of his father developed much skill in music. His talent for poetry caused his father to send him to Athens for instruction under Lasus of Hermione, the founder of an Athenian school of poetry. He returned to Thebes in 502 B. C., where he was further instructed by Corinna and Myrtis, two famous poetesses of Boeotia. His remarkable genius soon attracted the attention of many celebrated Hellenic rulers, and he was everywhere honored because of his scholarly and well-adapted compositions. Among his choral songs are a number composed for Alexander, King of Macedonia; Hiero, tyrant of Syracuse; and Arcesilaus, King of Cyrene. These and other compositions are remarkable for their

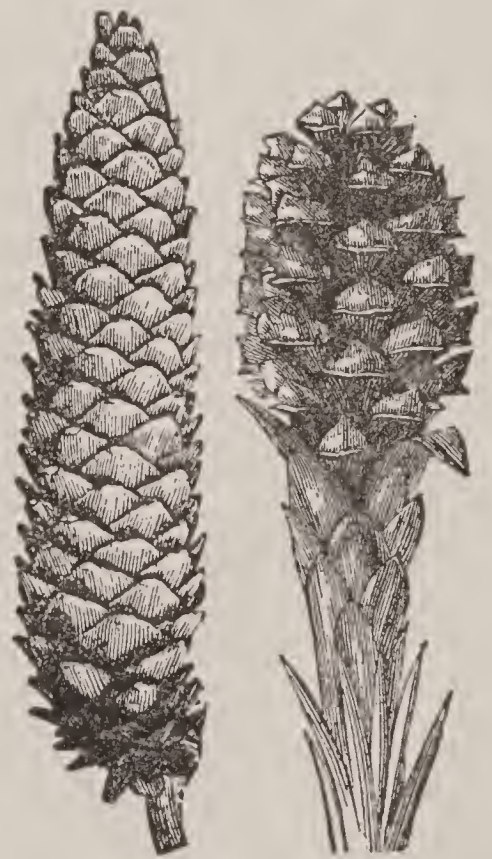
independent character, since he gives well-planned advice, praise, and reproof to his patrons. Most of his life was spent at the courts of kings and in witnessing festive games. To all of these he devotes attention in his poetical works.

Only fragments of the writings of Pindar are extant, but his "Triumphal Odes" is preserved in its entirety. This work is devoted to recounting the victories won at the Pythian, Olympian, Isthmian, and Nemean games, and not only celebrates the achievements, but intermingles beautiful choruses and pious devotion to the gods, to whom he accredits much of his success. Many of the works of Pindar have been translated and published in various editions, particularly those having for their basis the legends of Grecian literature. The Athenians held him in special esteem, since he showed a particular fondness for Athens, but many of the Greek states honored him with statues.

PINDAR, Peter. See Wolcott, John.

PINE, the name popularly applied to any tree of the genus *Pinus*. The trees of this group are distinguished by their woody cones and

numerous two-seeded scales from the spruces, larches, firs, cedars, and other trees of the same family, but of a different genus. The leaves are evergreen and needle-shaped, and vary in length from about an inch to more than a foot. They grow in small clusters of from one to five, according to the species, and are sheathed at the base by thin, chafflike scales. The leaves are so shaped at



CONES OF PINES.

the inner and outer faces that they make a solid cylinder when pressed together. Pines are confined exclusively to the Northern Hemisphere, where they grow in extensive groves in America, Europe, and Asia, but a distinct species is found in the Canary Islands. They thrive most abundantly in the temperate and cold regions and are rarely found in the Torrid Zone. In size they range from mere shrubs to stately trees fully 300 feet high. The pines are found mostly in groves and extensive forests.

The pine forests of the tropical regions are confined to the elevated mountains, while in the northern and colder climates they grow vigorously at sea level, though those confined to

the Arctic zone are mere shrubs. Seventy species have been described, of which 35 are native to North America, but only about six of these have more than local importance for lumbering purposes. The *white pine* is the most important of all the American species, and is found in abundance in the regions of the Great Lakes and the Saint Lawrence. This valuable tree extends far northward in Canada. It reaches a height of from 75 to 150 feet, measures about 12 feet around the lower part of the trunk, and in the larger forests it is beautiful for its straight grain and soft and light timber. Another lofty tree, the *loblolly pine*, has long leaves and is widely distributed in North America, but its timber is comparatively of little value. The *Norway pine* is of next importance and is found in the forests of Minnesota, Wisconsin, and Canada, where it is called *Canadian pine*. Its wood is heavy and resinous and is harder and more elastic than the white pine.

The *yellow pine* is found mostly in the Southern States, from southern New Jersey to Texas, and is known in the markets as *Georgia pine*. There may be said to be two species of the yellow pine—the *short-leaved* and the *long-leaved*—both of which have wood of a dark yellow to an orange color. However, the long-leaved is the most desirable for general building. The *Oregon pine* ranges from British Columbia to Mexico. This species grows in great forests and often attains a height of 300 feet. Its wood is hard and durable, has a yellowish color, and is valuable for all kinds of construction purposes. Several species yield large quantities of tar, turpentine, pitch, and resin, particularly the Norway pine and the yellow pine. The pine forests of Europe are most extensive in the Alps, the Pyrenees, and the Vosges, and there are vast forests in Russia and the Scandinavian peninsula. Large forests of pines occur in the Himalayas and other sections of Asia. The *Scotch pine* is a native of Western Europe and has been naturalized and planted extensively in America as an ornamental tree, being a favorite both on account of its excellently colored foliage and spreading branches.

PINEAPPLE, or *Ananassa*, a tropical plant much esteemed and cultivated for its fruit. It is so named because the fruit somewhat resembles in appearance the cone of the pine. The plant consists of a central axis with a tuft of rigid leaves springing from the roots to the upper part. A single spike of flowers appears at the upper end of a short flower stem, where a single fruit develops. The pineapple is propagated by a tuft growth that appears at the upper part of the fruit. This plant is native to the tropical parts of America. It is from ten to twenty inches high and grows wild in Brazil and other South American countries. Many of the species have been widely naturalized and are cultivated extensively. They may

be grown successfully in hothouses, but their culture for commercial purposes depends upon a warm climate and an abundance of moisture. Large plantations of pineapples are produced



PINEAPPLE.

in the Hawaiian Islands, the West Indies, the Philippines, and the southern part of the United States.

PINE BLUFF, a city in Arkansas, county seat of Jefferson County, on the Arkansas River, 41 miles southeast of Little Rock. It is on the Saint Louis, Iron Mountain and Southern, the Saint Louis and Southwestern, and other railroads. The place is beautifully situated on an elevated bluff and is surrounded by a rich farming country. The noteworthy buildings include the county courthouse, the Merrill Institute, the opera house, the high school, and the State normal school for colored students. Among the manufactures are flour, lumber products, cotton-seed oil, cotton goods, leather, and machinery. It has an extensive trade in cotton, tobacco, and cereals. Electric street railways, waterworks, pavements, and sewerage are among the public utilities. Population, 1900, 11,496; in 1920, 19,280.

PINERO (pī-nēr'ō), **Arthur Wing**, dramatist, born in London, England, May 24, 1855. He descended from Jewish parents, studied in private schools, and began the practice of law, but soon abandoned this profession for the stage. For some time he was connected with a company with which Henry Irving was associated, and from the latter he learned much of value in practical stage experience. In 1876 he completed his first play under the title "Two can Play at That Game." After 1881 he devoted himself to play writing and is the author of many dramas that became widely known. His chief works include "The Cabinet Minister," "Sweet Lavender," "The Gay Lord Quez," and "The Second Mrs. Tanqueray."

PINES, Isle of, an island of the West Indies, situated thirty miles south of Cuba, in the Caribbean Sea, constituting the principal island of the Archipelago de Los Canarreos. It is 61 miles long by 55 miles wide. The area is 982 square miles. The coast has several prominent indentations and near its shore are numerous smaller islands. It is in effect two islands,

connected by a marsh. In the northern part the surface is diversified by a number of mountains and in the southern it is low, flat, and sandy, but there are plains of great fertility. It is visited as a health resort because of its favorable climate and mineral springs. The products include tobacco, cattle, cotton, cereals, vegetables, and fruits. Excellent forests are abundant, including pine, cedar, mahogany, and other woods. Rock-crystal, marble, and other minerals are obtained in the mountains. The local seat of government is at Nueva Gerona, but it has been a dependency of the province of Havana, Cuba, for many years. Columbus discovered the Isle of Pines in 1494. The inhabitants include 267 Negroes, 198 foreign whites, and 2,480 native whites. Population, 1909, 3,276; in 1921, 4,515.

PING PONG, a game played on a table or board, which is marked to a scale modeled after the court used in lawn tennis. It is, in fact, a modified form of lawn tennis, but is adapted to be played indoors. The rackets, though small, resemble in form and style those of lawn tennis, and the ball is usually a light sphere of celluloid. The table should be about four feet wide and eight long, but in practice the size differs somewhat. The system of scoring is the same as in lawn tennis, but only a single service is permitted. This game was first called *gossima*, but the name was changed to ping pong in 1900. It is played to a considerable extent in Canada and the United States, but is particularly popular in France and England.

PINGREE (pīn'grê), **Hazen Senter**, public man, born in Denmark, Me., Aug. 30, 1840; died Oct. 18, 1901. He was the son of a poor farmer and worked in the cotton factory at Saco and later in a shoe factory at Hopkinton, Mass. In 1862 he enlisted for service in the Federal army, was captured by Mosby in 1864, and was imprisoned for some time at Andersonville. Immediately after the war he founded the shoe firm of Pingree & Smith at Detroit, which became one of the largest manufacturing establishments of the Northwest. The people of Detroit elected him mayor as a Republican for four terms. He was elected Governor of Michigan in 1896, which position he held until 1900. As mayor he was an active advocate of municipal reform, and as Governor he did much to improve the methods of taxation.

PINK, an extensive genus of plants, many of which have long been cultivated in gardens for their flowers. The numerous species, about 300, include both annuals and perennials. Florists generally group the pinks into three general classes—the *flakes*, *bizarres*, and *picotees*. A familiar species is generally known as the *garden pink*, or *peasant's-eye*. Many species have been grown as ornamental plants for ages and have been greatly improved by propagation. Those most extensively cultivated and best

known are the *garden pink*, *clove pink*, and *carnation*, while the *sweet William* is sometimes classed with the clustered flowering plants of this class. Pinks are native to the regions of



PICOTEE PINK. CARNATION PINK. GARDEN PINK.

the Mediterranean, but a single species is found in the west central part of North America. Those now cultivated in gardens have been acclimated by importation from Europe.

PINKERTON (pīn'kēr-tūn), **Allan**, American detective, born in Glasgow, Scotland, Aug. 25, 1819; died in Chicago, Ill., July 1, 1884. He emigrated to Canada in 1840 and soon after removed to Chicago, where he became a deputy sheriff. He was appointed a detective of the Chicago police department in 1850, after which he originated the celebrated Pinkerton Detective Association. The plot to assassinate President Lincoln while proceeding to Washington was discovered by him, and at the beginning of the Civil War he became chief of the secret service of the Federal army. To him is due the credit of discovering many secret plots, and he broke up the Molly Maguires in Pennsylvania. He published a large number of works, including "Railroad Forgers and the Detectives," "Spiritualists and the Detectives," "Gypsies and the Detectives," "Spy of the Rebellion," "Strikes, Communists, Tramps, and Detectives," and "Thirty Years a Detective."

PINNACE (pīn'nās), a large boat carried by ships, usually from 28 to 32 feet in length. It is somewhat larger than the cutter and smaller than the launch, and is rowed by six or eight oars. The name is sometimes applied to a single-masted vessel having oars or sweeps. A vessel of this class is capable of carrying from sixty to eighty tons and is employed by some nations for coast defense.

PINTO (pēn'tō), **Alexandre Serpa**, soldier and traveler, born in Douro, Portugal, April 20, 1846. He received his education at the Royal Military College, Lisbon, and soon after entered the Portuguese army in South Africa. He took part in the Zambezi War in 1869 and in 1877 entered upon an expedition to cross Africa from Benguela to Durban, reaching the latter place in 1879. The following year he be-

came aid-de-camp to the King of Portugal and subsequently made a number of exploring expeditions through Southern Africa. He published "How I Crossed Africa" and was fittingly honored by many important scientific and geographical societies.

PINTURICCHIO (pên-tōō-rêk'kê-ô), **Bernardino**, painter, born in Perugia, Italy, in 1454; died in 1513. He studied under Fiorenzo di Lorenzo and for some time was associated with Pietro Perugino. As a decorative artist he excelled and his portraits and historical paintings are generally admired. He painted some frescoes in the Sistine Chapel and the Borgia apartments of the Vatican, and planned a number of architectural structures in Rome. He executed noted portraits of Isabella the Catholic, Pius II., and Innocent VIII. His most famous work is the "History of Pius II.," painted in ten compartments in the library at Sienna, in which he was assisted by Raphael.

PIPE, an apparatus used by smokers of tobacco and other narcotics. It has two essential parts, the bowl and the stem. The former is the receptacle in which the substance is burned and the latter serves to draw the smoke into the mouth. Many kinds of pipes are in use and the materials from which they are made differ greatly, but usually clay or wood is used in constructing the cheaper grades. The finest pipes are made of meerschaum, a kind of compact magnesium stone, and of carved briar wood. The manufacture of pipes from meerschaum has reached its highest perfection in Vienna, where German manufacturers engage extensively in the enterprise, while large quantities of pipes are made with bowls of porcelain. Pipestems are usually made of different material from the bowls, in many cases of wood, bone, ivory, or amber, and usually these materials form the mouthpieces. Pipes made of costly material are trimmed with gold and other precious metals and the most expensive are set with fine stones. The American Indians made pipes of baked clay and soapstone and in most cases prepared the stems of wood. Pipes made wholly of baked clay were of frequent manufacture among primitive peoples. Many of the relics found with the remains of the moundbuilders include specimens of such pipes. Smoking tobacco in pipes is much more common in Europe than in America, the American smoker preferring to use cigars.

PIPE, an artificial tube or conduit used to convey liquids, such as gas, steam, water, and petroleum. A variety of materials are used in the construction of pipes, but they consist principally of lead, iron, gutta-percha, and clays. In size they differ greatly, ranging from one inch to five feet in diameter, though the larger sizes are principally of vitrified clays. Lead pipes are usually small and are employed chiefly for conveying water or steam for short distances. Mains used in waterworks are large-

ly of iron, while sewage and drainage are constructed through pipes or tiles made of fire clay.

Petroleum is conveyed great distances through pipe lines and often under high pressures, though sometimes by the force of gravitation. The first line of this kind in America was constructed from the oil fields in Pennsylvania to Pittsburg, the pipes having a diameter of four inches and the lines a length of 55 miles. A line was soon after built from Beaumont to the refineries at Port Arthur, Tex., and later a line was constructed from the oil fields of Oklahoma to the refineries at Port Arthur. Many of these lines are extensive. An 8-inch pipe line from Lima, Ohio, to Chicago has a length of 205 miles. The line from Olean to New York City is over 300 miles long, while the one from Colgrove to Philadelphia has a length of 235 miles. In 1908 there were about 40,000 miles of pipe lines for transporting gas and mineral oils in the United States. Similar lines are utilized in Canada, Italy, and Russia. The last mentioned country has thirty pipe lines of vast extent, some of them having 8-inch pipes. Pipes of this kind are made of iron, commonly in 18-foot lengths, and are connected by sleeve couplings with tapered threads. They are usually laid two feet below the surface and the oil or gas is pumped through the lines. Where they cross hills and mountains, as is frequently the case, it requires pumps of high pressure.

PIPEFISH, the name of a genus of fishes common to the warmer seas, but sometimes entering the adjacent fresh waters. These animals are peculiar for their tubular snout and long, slender body, which is covered with closely fitted bony plates. Adults attain a length of three feet, but the body is very thin and slender. About 150 species have been described, including several that are only a few inches in length. These animals are related to the sea horse, which they resemble in that the male has a brood pouch on the ventral side of the tail. In this pouch the young are carried for some time after they have been hatched, and even return to it during danger when they are of considerable size. Some of the species spend much of their time with their head downward in the water, stirring the sand with their snout, which they do most frequently among the blades of eelgrass. See **Hippocampus**.

PIPIT (pîp'it), or **Titlark**, a group of birds classed with the perchers. In many respects they resemble the lark. Many species have been described and some are widely distributed. The two species common to North America are the prairie lark and the American titlark, both of which sing while pursuing a circuitous flight through the air. The best known species of Europe are the rock, sea, and field pipits, but closely allied birds are common to many parts of Asia and Africa. They nest on the ground

and are easily distinguished by their simple and clear song.

PIQUA (pĭk'wà), a city of Ohio, in Miami County, on the Miami River, 87 miles north of Cincinnati. It is on the Cincinnati, Hamilton and Dayton and the Pittsburg, Cincinnati, Chicago and Saint Louis railroads, and on the Miami and Erie Canal. The principal buildings include the city hall, the high school, the Schmidlapp Library, and many churches. Among the manufactures are flour, carriages, corrugated iron, hardware, furniture, woolen goods, and linseed oil. The surrounding country is agricultural and dairying. Electric street railways, pavements, waterworks, and street lighting are among the improvements. Population, 1900, 12,172; in 1920, 15,044.

PIQUET (pĕ-kĕt'), or **Picket**, a game of cards played by two persons, who use all the cards except those with two, three, four, and five spots. Each player receives twelve cards, either two or three being dealt at a time, and the talon or stock is then placed upon the board. The one who first receives his hand has the the right to draw from the board five cards in their natural order and he must discard the same number, but at least one of the cards drawn must be discarded. From the cards drawn and dealt he is enabled to arrange his hand with reference to the various scores, after which he is followed in drawing and discarding by the dealer, who may take all the other player has left. Tricks are taken in the usual manner by the same suit. Immediately after dealing the cards, before any are discarded, the player who has no face card scores ten points. Points are also counted by the player who has the greatest number of cards of any one suit, who has four cards of equal value in four different suits, and who takes the greater number of tricks. The game is 100 points.

PIRACY (pĭ'rà-sÿ), the practice of robbery on the high seas and which, if committed upon land, would constitute felony. Many of the nations have adopted statutes that make persons guilty of piracy who in any way aid pirates, or conduct trade with them. Most civilized nations regard persons who forcibly convey or remove others as slaves guilty of piracy. The penalty for conviction is a long term of imprisonment, but formerly the penalty was death, which extended not only to the principal, but to all those implicated as aids or supporters of pirates. Piracy is older than human history. Accounts of daring deeds of sea rovers have come down to us from ancient peoples through tradition and history.

The Phoenician colonists regarded piracy an honorable occupation and made it a prolific source of profit. This was likewise the view taken by the early Grecians and Romans. Great bands of pirates had their seat for centuries in various regions bordering on the Mediterranean. Pompey was given command of a large mili-

tary and naval force by the Roman government for the purpose of subduing the pirates who infested the sections adjacent to Rome. The Northmen were the most noted pirates of Europe and commanded the northwestern coasts from the 7th to the 11th centuries. It was partly for protection against the sea rovers that the Hanseatic League was formed by European cities. Southern Europe was harassed by pirates from Algeria and other regions of North Africa up to the early part of the 19th century, and many vessels came in contact with them while sailing the Indian and Atlantic oceans.

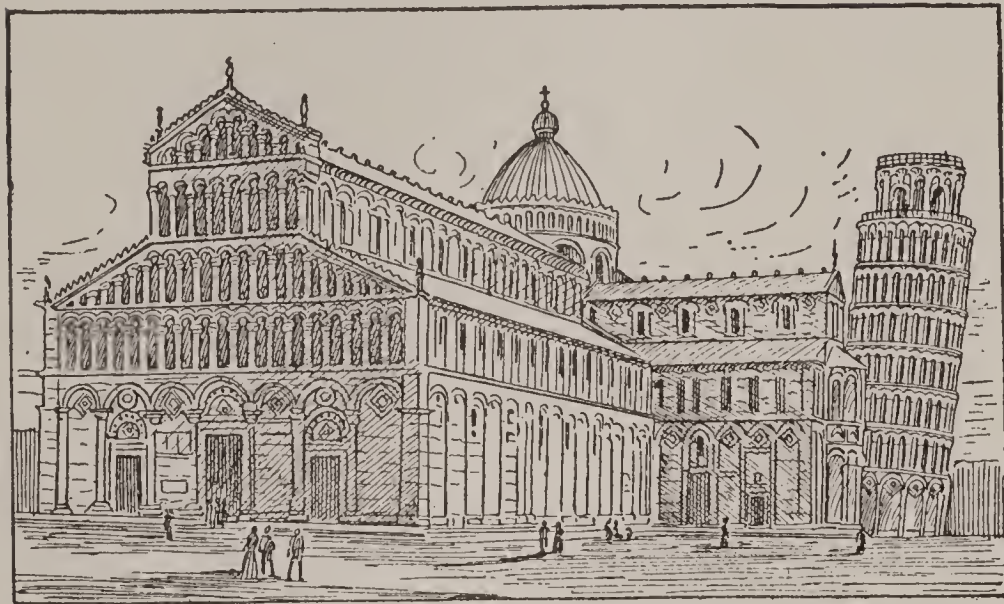
The American colonists were preyed upon by pirates in the 17th and 18th centuries. These pirates had their seat in the swampy regions of Florida and in the islands southeast of the United States. A pirate named Teach, and sometimes called *Black Beard*, was one of the most noted outlaws of this period. He preyed upon the Spanish possessions in the South and had trade relations with citizens of the United States as far north as Philadelphia, but was finally expelled from North Carolina by Governor Johnson. A London company sent Captain Kidd to subdue the pirates in 1696. He soon after adopted the practice and terrorized the eastern coast of North America, but was finally apprehended and executed in 1701. In 1841 the United States declared the slave trade a form of piracy and it was recognized as such by England, Germany, Russia, and Austria. The system of international treaties among civilized nations has overcome piracy almost entirely, though it is still practiced to a limited extent in Southeastern Asia.

PIRAEUS (pĭ-rĕ'ūs), a city of Greece, situated five miles southwest of Athens. It is the seaport of that city. The site is on a peninsula of the same name and on the shore of a harbor formed by the Saronic Gulf. It is renowned as the seaport of ancient Athens and was connected with it by the famous Long Walls. The Romans under Sulla destroyed the city in 86 B. C., and during the long possession by Turkey it formed only a mass of ruins. Since then it has developed extensive manufactures and an important foreign trade. It is connected with Athens by a railway and its harbor has been greatly improved. The modern city dates properly from 1834. It has fine public buildings and many substantial residences and business houses. Population, 1916, 73,306.

PISA (pĕ'sà), a city of Italy, capital of a province of the same name, on the Arno River, 44 miles west of Florence. It has well platted and paved streets and is connected with Leghorn, Florence, and other cities by an extensive railway system. Once a city of great wealth and renown, it still contains a number of evidences of its former prosperity. Among the most noteworthy buildings is a cathedral dating from the 11th century, in which there are paint-

ings by a number of Italian masters. It has a dome of great beauty. Near this cathedral is the famous Leaning Tower of Pisa, a remarkable structure built in the 12th century by the German architect, Willheim of Innsbruck. This tower leans about fourteen feet from the perpendicular, is 180 feet high, and has eight stories. Upon its flat roof is an open gallery from which the surrounding country may be viewed.

Opposite the cathedral is the Church of Saint John, a remarkable building completed in 1162, in which the finest sculpture of Nicola Pisano



CATHEDRAL AND LEANING TOWER OF PISA.

(1226-1273) may be seen. Another building of much renown is the Campo Santo, dating from 1228. Pisa has a splendid library of 125,000 volumes, which is situated in the university, an institution attended by 1,200 students. Connected with the university are a fine campus, a botanical garden, and a museum of natural history. It has electric street railways, gas and electric lighting, and systems of sewerage and waterworks. The manufactures embrace cotton and woolen goods, ribbons, silks, utensils, clothing, earthenware, and machinery.

Pisa was founded by the Etruscans, but later became a part of Rome. Roman occupation dates from the 2d century B. C., but it retained its own municipal government for many years. In the 11th century it was organized as a republic. At that time its splendid works of art were constructed and its vast buildings and fortifications were erected. The German emperors governed it after the fall of the republic. At this time it had 150,000 inhabitants, but it gradually fell into decay. The decline was due to the extended contentions between the Guelphs and the Ghibellines, and at one time its inhabitants numbered less than 10,000. It was made a part of the kingdom of Italy along with the remainder of Tuscany in 1860. Population, 1916, 62,405.

PISCES (pĭs'sēz), the twelfth sign of the zodiac, which is entered by the sun on Feb. 20. Formerly it corresponded to the constellation of Pisces (the fishes), but the constellation is now

mostly in the sign Aries, owing to the precession of the equinoxes. It contains no prominent stars, but includes a number of interesting double stars. See **Zodiac**.

PISCICULTURE (pĭs-sĭ-kŭl'tŭr). See **Fish Culture**.

PISIDIA (pĭ-sĭd'ĭ-ā), an ancient country of Asia Minor, which occupied a region north of Pamphylia. The northern boundary was formed by Phrygia. The surface of this region is mountainous, including the loftiest ranges of the Taurus Mountains. It is drained by the Cestus and Eurymedon rivers, and contains a fresh-water lake about thirty miles long. The lake and rivers are noted for their fisheries. The inhabitants were long noted as sturdy mountaineers, who resisted with great energy the encroachments and incursions of foreigners. Xenophon mentions the Pisidians in his "Anabasis," and subsequently they were referred to by the leading Grecian historians. Alexander the Great came in contact with them when conquering Western Asia, but the Romans completely crushed their power and made them a part of the imperial territory. Their most noted cities included Antioch, Termessus, Selge, and Sagalassus. The sites of these cities have yielded many remarkable

relics.

PISISTRATUS (pĭ-sĭs'trā-tŭs), tyrant of Athens, born about 612 B. C.; died about 527 B. C. He was the son of Hippocrates and in his early political life supported the policy of Solon. Later he became allied with one of the three parties of Attica, becoming its recognized head, his wealth and scholarly eloquence making him one of the most influential leaders of his time. It is claimed that, after a violent dispute with Megacles in the public assembly, he came to the market place with self-inflicted wounds, which he pretended were received from political opponents. The people became indignant at the apparent ill treatment and placed a guard for his protection. This guard was skillfully increased until he was able to control the city and in 560 B. C. Megacles fled, but Solon remained at Athens and continued to oppose the dictatorial policy of Pisistratus.

Although termed a tyrant, he was by no means oppressive, but wisely enforced the laws of Solon and provided for the material welfare of the city. After six years he was compelled to surrender his authority, but he succeeded in making himself master of the city a second time by the aid of Thebes and Argos. After five years he was again driven from Athens only to return after a short time. The rule of Pisistratus is noted for the erection of many public buildings and the establishment of libraries. He made ample provisions for the employment and support of the poor. He is credited with

the collection of the poems of Homer, though the earlier authorities do not make mention of this. His country enjoyed greater prosperity and longer peace during his reign than in a majority of the administrations. In the latter part of his reign he conquered Naxos. His sons succeeded him.

PISTOL. See **Revolver**.

PITCAIRN (pĭt'kârĭn), **John**, soldier, born in Fifeshire, Scotland, in 1740; died in 1775. He entered the military service and was rapidly promoted, being made a captain in 1765 and a major in 1771. For some time he was stationed at Boston under General Gage, who sent him to Concord in 1775 to destroy the military stores. However, he was confronted by minutemen at Lexington, who refused to disperse at the order of the British, when the soldiers fired and killed seven Americans. There has been an extended dispute as to which fired the first shot, though Major Pitcairn maintained that the soldiers were first fired upon by the colonists. On June 17, 1775, in the Battle of Bunker Hill, he was mortally wounded.

PITCAIRN ISLAND, an island of the South Pacific Ocean, situated between Australia and South America, in the southeastern part of the Polynesian Archipelago. It is about one mile wide and two and one-fourth miles long. The surface is fertile, though the coasts are high and rocky, and there is an abundance of timber. This island, first visited by Carteret in 1667, is of itself unimportant, but it is celebrated on account of its becoming the dwelling place of a number of mutineers. In 1789 the British ship *Bounty* was sent from India to the West Indies, but when it reached Tahiti, one of the Caroline Islands, where a supply of breadfruit trees was to be gathered, the season for taking them up had not arrived. For two months the crew was idle and during this time became demoralized and soon after mutinied. The captain and those who would not join them were put off in a boat and set adrift on the ocean. After 46 days they reached inhabited land. However, the mutineers returned to Tahiti and nine of these with a number of native men and women sailed from Tahiti in 1790 and formed a settlement on Pitcairn Island, which was then uninhabited.

An Englishman named Alexander Smith changed his name to John Adams, and became recognized as the leader of the little colony. Several of the Tahitians were murdered as the result of quarrels, but the others remained on the island, and Adams directed educational and Christian instruction. It was thought that the *Bounty* and its occupants had been lost at sea until in 1808, when Captain Folger with the American ship *Topaz* discovered them, but Adams was the only one of the mutineers who was then alive. However, there were a large number of fine farms and houses on the island, and the descendants of the mutineers had ad-

vanced remarkably in educational and industrial arts. A British vessel visited the island in 1831, when the inhabitants numbered 87, and in the same year transferred them to Tahiti, but they returned to Pitcairn within a year. In 1856 they numbered 194, and it was found that the island was too small to support that number. They were accordingly removed to Norfolk Island, but about forty soon after returned. The population at present is about 125.

PITCH, a product obtained by boiling tar until the volatile naphtha is driven off. It may be obtained from wood and coal tar, stearine residue, bone tar, and petroleum. Pitch has a dark color and brilliant luster and is solid at ordinary temperatures. It is used extensively for closing up seams in shipbuilding, for keeping wood from decay and iron from rusting when exposed to the weather, and for making artificial asphalt. A grade produced in Finland is called *Burgundy pitch* and has medical properties. The term *mineral pitch* is sometimes applied to asphalt.

PITCHER PLANTS, a group of plants which have their leaves or petioles formed like pitchers, in which more or less fluid is stored.



EAST INDIAN PITCHER PLANT.

Botanists classify them into two general divisions, known as the American and East Indian pitcher plant families. The *American pitcher plants* include five or six species, found mostly in the eastern part of the United States, California, and Canada. A familiar species, the *sarracenia*, is found in the eastern part of the continent and elsewhere. The *East Indian pitcher plants* include a large number of species and are found widely distributed in Australia, the East India Islands, and Southern Asia. These plants are inclined to be shrubby or herbaceous and grow best in low or swampy regions. Each leaf is prolonged and forms a

cuplike vessel resembling a pitcher, and over the top extends a lid that may be regarded the true leaf blade. The plant secretes the fluid. This fluid attracts insects, such as flies and beetles, and they are often found drowned in it. Darwin classed these plants among the insectivorous, for the reason that the drowned insects are dissolved and absorbed by the plants as nutritious matter. Pitcher plants are cultivated to some extent in hothouses for their flowers and foliage.

PITH, or **Medulla**, the cylinder of soft, spongy tissue in the center of the stems or branches of exogenous plants. The stems of young plants are composed entirely of pith and bark, but later the woody fiber develops, and the pith is reduced until it forms only a small cylinder in the developed stem. Pith is composed of cellular tissue, which in young plants contains starch, but later air takes its place. The cells are smallest at the circumference. There is a connection between the pith and the bark by the *medullary lines*, these serving to convey secretions from the bark to the interior.

PITMAN (pīt'man), **Benn**, artist and stenographer, born at Trowbridge, England, July 24, 1822. He was a brother of Sir Isaac Pitman, the inventor of the Pitman system of phonography. In 1853 he came to the United States and settled in Cincinnati, Ohio, and became interested in the publication of text-books in shorthand. From 1862 to 1865 he served as official reporter for the government and devoted his attention to professional reporting a number of years. He became connected with the Cincinnati School of Design as a teacher of descriptive art in 1873, originated what became known as the Pitman School of Wood Carving, and produced many beautiful wood carvings and naturalistic designs in wood sculpture. He published "History of Shorthand," "Life of Sir Isaac Pitman," and "A Plea for Alphabetic Reform." He died Dec. 28, 1910.

PITMAN, Sir Isaac, educator and inventor of the Pitman system of shorthand writing, born in Trowbridge, England, Jan. 4, 1813; died Jan. 22, 1897. He secured his education at the Normal College under the direction of the British Foreign School Society. In 1832 he became a teacher at Barton-on-Humber, and subsequently taught at Wotton-under-Edge. In 1839 he removed to Bath, where he organized the Phonetic Society, and later established a printing office to publish the text-books of shorthand used in his work. He established the *Phonetic Journal*, a periodical devoted to reforms in writing and spelling, and published a large number of manuals and text-books on phonography. The Pitman system of shorthand is used by a large per cent. of reporters in America and Great Britain. It has been adapted for use in the German, French, Dutch, Spanish, Italian, Turkish, Japanese, and many other languages. Gold medals were presented

to him by the phonographers of the United States. In 1887 he received a marble bust of himself at a phonographic association meeting. Queen Victoria knighted him in 1894. His most important publications include "Writing by Sound" and "Phonographic Reporter's Companion."

PITT, William, Earl of Chatham, noted orator and statesman, born in Cornwall, England, Nov. 15, 1708; died May 11, 1778. He was the son of Robert Pitt, a country gentleman, studied at Eton and Oxford, and after graduating made an extensive tour of Europe. In 1735 he was elected to Parliament, where he supported Frederick, Prince of Wales, in opposition to the king and Walpole, the latter being minister at that time. His aggressive attitude induced the government to deprive him of his commission, but his ability and eloquence caused his influence in public affairs to increase steadily. When Walpole was defeated, in 1742, Pitt again entered the government service and soon after became Secretary of State. He became Prime Minister at the beginning of the Seven Years' War, in 1757, and during the four years of his ministry Great Britain attained many of its greatest achievements. The forces of France were defeated everywhere—on the Rhine, in India, in Canada, and in Africa.

Pitt was the director of all the great movements of the military and naval forces, and to him may be attributed in a large measure the winning of both India and Canada. He opposed the tax act proposed by Parliament, on the ground that taxation should not be imposed upon any colony without representation, but later he modified his view and vigorously opposed those wishing to grant independence to the colonies. At the accession of George III. he resigned his office, but continued to exercise much influence in the government, both domestic and foreign. Pitt was one of the most aggressive English statesmen opposing American independence, and, when a treaty was made between the American colonies and France, he looked upon proposals of peace as overtures to prostrate Britain before the Bourbons of France. His last noted speech before the House of Lords was in opposition to making peace with the colonies and the acknowledgment of the independence of the United States, and four days later he died at Hayes. He was buried in Westminster Abbey, where a statue commemorates him. In 1766 he was made Viscount Pitt and Earl of Chatham.

PITT, William, second son of William Pitt, Earl of Chatham, born near Kent, England, May 28, 1759; died Jan. 23, 1806. He was born at the time his father was honored as the most illustrious English citizen. His early education was gained at home under the supervision of his parents, and when but fifteen years of age he had a wide knowledge of mathematics and ancient languages. He was educated at Cambridge,

and in 1780 became a member of the bar. After making a tour of Europe, he stood as a candidate for Parliament from the university, but was defeated. However, he entered Parliament



WILLIAM PITT.

in January, 1781, and on Feb. 26 of the same year made his first speech in favor of the economical reforms proposed by Burke. In 1782 he became Chancellor of the Exchequer under the Earl of Shelbourne. When the Shelbourne ministry was

defeated the following year on account of the preliminary treaty of peace with the United States, King George III. offered to appoint Pitt as Premier, but this he declined without hesitation, though when the ministry of Portland was dissolved soon after he accepted the appointment. His administration of the treasury was noted for marked financial ability and his ministry, beginning in 1784, though he was then but 25 years of age, became one of memorable strength.

Among the notable events taking place at the time of his ministry is his regency bill of 1788, the French Revolution, the war with France in 1793, and the union with Ireland in 1800. Pitt resigned the ministry in 1801 because of the king's opposition to concession to Irish Catholics, but after several years he was again appointed to the ministry. His greatest energy was directed against the growing power of Napoleon. When the Battle of Austerlitz was won by that commander, Pitt was thrown into profound sorrow, which hastened his death. Writers have expressed much difference of opinion as to the merit of Pitt's statesmanship, some according him an exalted position and patriotic sentiments, while others regard him as jealous for public favor and quite devoid of original ideas. He was buried in Westminster Abbey beside his father.

PITTI PALACE, a celebrated structure in Florence, Italy, now used as a royal residence. It is one of the largest and most imposing palaces of the world and is in the early Renaissance style, after plans made by Brunelleschi in 1740. It was constructed for Luca Pitti, a member of the Pitti family, who was then magistrate of the Republic of Florence. This palace contains a valuable art collection, including noted paintings of Titian, Raphael, Giorgione, Rubens, Murillo, Dürer, and Rembrandt.

PITTSBURG (pīts'bûrg), a city of Kansas, in Crawford County, 55 miles northeast of Independence and 130 miles south of Kansas City. It is on the Kansas City Southern, the Saint Louis and San Francisco, and the Atchison, Topeka and Santa Fé railroads. The surrounding country has valuable deposits of coal and zinc and produces cereals and fruits. The chief buildings include the public library, the high school, the opera house, and a branch of the State Normal School. Among the manufactures are packed meats, cigars, brick, clothing, earthenware, and machinery. It has a large trade in farm produce and coal. The zinc works employ about 1,000 persons. Pavements, waterworks, sanitary sewerage, and electric street railways are among the public utilities. It was first settled in 1876 and was incorporated in 1880. Population, 1904, 14,368; in 1920, 18,052.

PITTSBURG, the second city of Pennsylvania, capital of Allegheny County, at the confluence of the Monongahela and Allegheny rivers, which unite to form the Ohio. It is 450 miles east of Chicago, 254 miles northwest of Philadelphia, and 275 miles west of New York. At the river level the altitude is 702 feet above the sea, but a large part of the site is elevated considerably above the river and stretches over an undulating and, in places, hilly region. The older part of the city is in a peninsula formed by the two rivers and at this place the streets are narrow and somewhat irregular, but the larger part of the business section and nearly all the residential quarters are regularly platted, the streets crossing each other at right angles. All the residential sections are beautified by parkings and avenues of trees. The city proper covers an area of about 35 square miles, but near it are many outlying suburbs, though a number of such districts have been absorbed by the city recently.

BUILDINGS. The architecture is largely of stone, which is quarried within easy access of the city. The Allegheny County courthouse, on Grant Street, is one of the finest buildings of the kind in the country, costing about \$4,125,000. The post office, on Smithfield Street, is a fine structure and contains a number of Federal offices, including the district and circuit courts of the United States. The Frick Building, a granite structure twenty stories high, finished in marble and mahogany, is one of the finest office buildings in the world. Other prominent buildings include the Carnegie, the Arrott, the Park, the Empire, and the Peoples' Bank for Savings. The Trinity Church (Episcopal), the First Presbyterian, the Church of the Ascension (Episcopal), the Saint Paul's Cathedral (Roman Catholic), the Christ Methodist Episcopal, and the Sixth United Presbyterian are among the leading ecclesiastical buildings. The Henry, the Lincoln, and the Schenley are among the finest hotels.

EDUCATION. Pittsburg has an extensive sys-

tem of public schools, which is under the supervision of a central board of education. It is the seat of the Western University of Pennsylvania, which maintains the departments of law, medicine, pharmacy, and dental surgery. The Carnegie Institute, established in 1901, is well equipped for instruction in technology. Other institutions include the Pittsburgh College of the Holy Ghost, the Pennsylvania College for Women, the Pittsburgh Female College, and the Shadyside Academy. The Carnegie Free Library, completed in 1895, has a fine museum and an art gallery. With it are affiliated several collections of books that were founded previously, the entire number including about 200,000 volumes. Many charitable and private educational institutions are maintained. The West Penn, on Twenty-eighth Street, is the largest hospital in the city. Other institutions of this kind include the Passavant, the Mercy, the Charity, the Free Dispensary, and the Florence Crittenton Home.

PARKS. About 1,250 acres are included in the parks within the city, and a number are maintained in the district lying near the city limits. Schenley Park, a tract of 440 acres, was acquired in 1890. It contains the Phipps Hall of Botany and the Phipps Conservatory. In Highland Park, a tract of 441 acres, are several fine statues and the zoölogical gardens. A number of small parks, such as McKinley, Central, Grand View, and Herron Hill, are located in convenient parts of the city. Highland and Schenley parks are connected with the more populous parts of the city by Grant and Beechwood boulevards, and other fine drives extend through the residential centers. Allegheny, Homewood, Southside, and Calvary are among the principal cemeteries.

COMMUNICATION. Pittsburgh is the focus of many trunk railways, including the Pennsylvania, the Baltimore and Ohio, the Erie and Pittsburgh, the Wabash, the Pittsburgh and Western, and the Pittsburgh, Cincinnati, Chicago and Saint Louis railroads. Fine stations are maintained by a number of the lines and the Pennsylvania system has a large union depot. Communication within the city is facilitated by an extensive system of electric railways, which has branches in all parts of the city and connections to many suburban and interurban points. Numerous railway and wagon bridges cross both the Allegheny and Monongahela rivers, thus connecting the main business section of Pittsburgh with the portion lying south of the river and with the parts located west of the Allegheny, which was formerly the city of Allegheny. The streets are well paved, largely with brick, stone, or asphalt. An extensive system of drainage is maintained. The waterworks are owned and operated by the city. Gas and electric lighting, an efficient fire department, and the system of police service are well organized.

COMMERCE AND MANUFACTURES. The city has a large trade in minerals, merchandise, and machinery. This trade is carried partly on the Ohio River, but principally by the extensive lines of railroads that center here. Coal and coke furnish the largest tonnage and in quantity exceed the trade in these commodities of all cities of the world. Pittsburgh developed large interests in glass and iron making at an early date. Nearly one-fourth of the entire output of pig iron in the country is obtained from the city. From its extensive interests in iron and blast furnaces it is popularly called the *Iron City*. Among the principal manufactures are wire, nails, rails, steel plate, stoves, electrical machinery, railway cars, and furniture. The city produces large quantities of boots and shoes, tobacco and cigars, malts and spirituous liquors, pottery and brick, shot and lead pipe, paper and paper pulp, and clothing. It has a number of large petroleum refineries.

HISTORY. Pittsburgh occupies the sites of Fort Duquesne and Fort Pitt, built respectively by the French and English. The former was erected in 1754 and was attacked by the British under General Braddock, who was defeated with heavy losses. In 1758 the fort was attacked by an army under General Forbes, who captured it and changed the name to Pittsburgh, in honor of William Pitt. Fort Pitt was built by General Stanwick in 1759 and constituted a strong means of defense during Pontiac's War. A blockhouse of brick was erected by the British under Colonel Bouquet in 1764, on the point of land near the junction of Allegheny and Monongahela, and this is now owned and preserved by the Daughters of the American Revolution.

Washington visited Pittsburgh in 1770, when the village contained about twenty small houses. Continental troops had possession of it during the Revolutionary War and lots began to be sold quite extensively in 1784. After 1785, following the opening of the Northwest Territory, Pittsburgh grew rapidly. A new impetus was given when the Pennsylvania Canal was opened, in 1834, and railroads began to build soon after. In 1903 the Legislature enacted a law to permit a number of municipalities to unite with Pittsburgh and to make the city coextensive with Allegheny County. In 1900 the city proper, before annexations were made, had a population of 321,616. Within recent years it has grown very rapidly. Population, 1920, 588,193.

PITTSFIELD (pĭts'fēld), a city in Massachusetts, county seat of Berkshire County, on the Housatonic River, 150 miles west of Boston. It is on the New York, New Haven and Hartford and the Boston and Albany railroads. The site is an elevated plateau surrounded by hills. Several picturesque lakes are in the vicinity. It has a beautiful site on an elevated plateau. Among the manufactures are paper, shirts, electric machinery, brass castings, shoes,

cotton and woolen goods, silk textiles, and utensils. It is the seat of a training school for nurses, an old woman's home, and the Hospital of the House of Mercy. Among the noteworthy buildings are the county courthouse, the Crane Art Museum, the public library, the Berkshire Savings Bank, and many fine churches. The municipal facilities are modern and include public lighting, street railways, sanitary sewerage, and waterworks. It was settled in 1743, when it was known as Boston Plantation, and was incorporated in 1761 under its present name. Population, 1920, 41,751.

PITTSTON (pīts'tūn), a city of Pennsylvania, in Luzerne County, on the Susquehanna River, 105 miles northwest of Philadelphia. It is on the Erie, the Central of New Jersey, the Delaware and Hudson, the Lehigh Valley, and other railroads. The place is surrounded by a region rich in anthracite coal. It is connected by two bridges with West Pittston, a suburb on the west bank of the Susquehanna, which has a population of 6,048. The noteworthy buildings include the public library, the city hall, the high school, and a number of fine churches. Among the manufactures are hardware, terra cotta, hosiery, lumber products, engines, paper, and leather. It has an important trade in coal and merchandise. Pittston was platted in 1770, when it was named in honor of William Pitt, and was chartered as a city in 1894. Population, 1900, 12,556; in 1920, 18,494.

PIUS (pī'ūs), the name of nine popes, six of whom are treated in special articles below. Little is known of Pius I., but it is certain that he was bishop of Rome from 142 to 157 A. D. It is thought that he was born at Aquileia, Italy, and that he suffered martyrdom. Pius III. was born at Siena, May 9, 1439; died Oct. 18, 1503. He became Pope on Sept. 22, 1503, and it is thought that his death, which occurred the same year, resulted from poison administered by an enemy. Pius VIII. was born at Cingoli, Nov. 20, 1761; died in Rome, Nov. 30, 1830. He became Pope in 1829 and was succeeded by Gregory XVI. in 1831. See **Pope**.

PIUS II., Aeneas Sylvius Piccolomini, Pope of Rome, born at Corsignano, Oct. 18, 1405; died Aug. 14, 1464. He received a liberal education and when 26 years of age became secretary to the cardinal of Fermo. Emperor Frederick III. of Germany appointed him to office in the imperial court and named him as ambassador of a diet at Ratisbon. In 1446 he became the German ambassador to Pope Eugenius IV. for the purpose of negotiating papal submission to Germany. His skill and trustworthy disposition caused the Pope to retain him as secretary. In 1447 Pope Nicholas V. created him bishop of Trieste, and in 1456 he was made cardinal by Callistus III. He succeeded the latter as pontiff in 1458, and immediately published a bull in opposition to the proposition to create a general council to the

Pope, though previously he had favored the superiority of such a council. He is noted as having greater ability and vigor than the popes that preceded him.

PIUS V., Michele Ghislieri, Pope of Rome, born in Bosco, near Alessandra, July 17, 1504; died May 1, 1572. He descended from poor parents and entered the Dominican Order in 1528. Pope Paul IV., being attracted by his eminent ability, appointed him bishop of Sutri in 1556. The following year he was made cardinal and on Jan. 8, 1566, was chosen as Pope to succeed Paul IV. His administration is noted for great rigor in endeavoring to reform the morals of Rome, where he prohibited public amusements of various kinds, particularly demoralizing exhibitions and bull fights. He was a supporter of the Inquisition and persecuted both Jews and Protestants who refused to embrace his faith. He excommunicated Queen Elizabeth in 1570. In the later part of his pontificate he joined Venice and Spain in an expedition against the Turks and on Oct. 7, 1571, the great naval victory of Lepanto was won by the allied forces. Clement IX. canonized him in 1712.

PIUS VI., Giovanni Angelo, Pope of Rome, born in Cesena, Dec. 27, 1717; died Aug. 29, 1799. He became secretary to Benedict XIV. and Clement XIV. appointed him cardinal. He succeeded the latter as pontiff on Feb. 15, 1775. His election caused him to become involved in difficulties, and in 1798 General Berthier marched into Rome and proclaimed it a republic, demanding that Pius renounce the temporal authority. However, he refused to comply with this request and was accordingly imprisoned at Florence. Later he was confined at several other cities, remaining in confinement until his death. The early part of his reign was disturbed by difficulties with Leopold of Tuscany and Emperor Joseph of Austria, who deprived him of some of his territory, but his administration as a whole demonstrates that he was fair-minded and devoted to reforms. During his reign Rome was greatly improved by numerous substantial buildings, parks, thoroughfares, and modern facilities. He attracted many artisans and learned men to Rome.

PIUS VII., Gregorio Barnaba, Pope of Rome, born in Cesena, Aug. 14, 1742; died Aug. 20, 1823. He joined the Benedictine Order at an early age and engaged as teacher of philosophy and theology at Parma and Rome. First bishop of Tivoli, he soon after became cardinal and on March 14, 1800, succeeded Pius VI. as pontiff. French troops had occupied Rome for a number of years, but they were withdrawn shortly after he became Pope and papal authority was restored. He selected Cardinal Consalvi as his secretary, who was soon after sent to Paris to complete a treaty with Napoleon whereby religious practices were restored in France on the former basis of con-

nection with Rome. Napoleon invited Pius to come to Paris in 1804 that he might crown him as emperor, which request was granted. While in Paris he was shown great distinction, but it was sought to secure a modification of the treaty then existing between France and the papal state. However, relations soon began to be less friendly in character. In 1808 Napoleon again sent troops to occupy Rome and he annexed by proclamation the provinces of Urbino, Ancona, Macerata, and Fermo to Italy.

Pope Pius protested against the usurpation of power by Napoleon, but the latter issued a decree annexing Rome to France in 1809. The French general soon after removed the Pope from Rome to Florence and later to Grenoble and Savona. He was finally transferred to Fontainebleau in 1812, where he was compelled to sign a concordat annexing all of the Roman states to France. The disastrous campaigns of Napoleon in 1813 modified his policy somewhat, and, when the allies finally occupied Paris, in 1814, steps were immediately taken to restore the Pope to his possessions. The congress of Vienna took final action and on May 24, 1814, Pius reentered Rome amid great public rejoicing. He was compelled to leave Rome when Napoleon returned from Elba, but after the defeat at Waterloo he remained undisturbed in his possessions until his death. Pius is noted for marked benevolence and Christian charity, and promulgated and enforced laws with much moderation and wisdom. He reestablished the Society of Jesus in 1814.

PIUS IX., Giovanni Maria Mastai Ferretti, Pope of Rome, born at Sinigaglia, May 13, 1792; died Feb. 8, 1878. He was the fourth son of Count Jerome, who designed him for a military life, but later he studied theology and received holy orders. After ministering for some time in Rome, he was sent to Chile as auditor of the vicar apostolic and in 1846 succeeded Gregory XVI. His influence had been with the party advocating reforms and his accession was signalized by the release of 2,000 political prisoners. Soon after he issued a general amnesty for political exiles. It was his design to govern Italy under a liberal constitution and to provide for a legislative department of two branches, one appointed by the Pope and the other chosen by popular suffrage. However, before these measures could be adopted the Revolution of 1848 spread rapidly, and in 1849 a Roman republic was proclaimed under the leadership of Mazzini. The Pope found safety in escaping to Gaeta, whence he issued an address to the sovereigns of Europe in remonstrance to the course of events. The president of France, Louis Napoleon, sent an expedition to Italy for the purpose of restoring the Pope. Garibaldi and his army of Italian patriots were defeated, Rome was occupied on July 3 of the same year, and Pius returned in April, 1850.

Pope Pius then assumed a more conservative

course in his government, which he left largely to his secretary of state, Cardinal Antonelli. Among the important events of his reign are included the bull of 1854, declaring that the immaculate conception of the Virgin Mary is a church doctrine, and the assemblage of the Vatican Council that held a session in Rome from December, 1869, to July, 1870. This council was composed of bishops from all parts of the world and was the first to proclaim officially the doctrine of papal *infallibility*. The military forces of Victor Emmanuel took possession of Rome in 1870 and made it the capital of United Italy, and subsequently the Pope exercised only spiritual power. His pontificate is the longest on record, 32 years.

PIUS X., Giuseppe Sarto, Pope of Rome, born at Riese, Italy, June 2, 1835. He descended from humble parentage and resided in the northern part of Italy the greater part of his life. After studying at Treviso and Padua, he was ordained priest in the Cathedral of Castel Franco in 1858. Soon after he was made cure in the parish of



PIUS X.

Tombolo, whence he was transferred as parish priest to Salzano in 1867. Leo XIII. appointed him bishop of Mantua in 1884, where he won the favor of his superiors by faithful performance of his duties as bishop. He was created cardinal and patriarch of Venice in 1893. At that time various disputes arose between the government and the Holy See, but he won the confidence of the people by efficient service and modesty in personal affairs. In 1903 he was elected Pope over Gotti and Rampolla, his two leading competitors, and was crowned in Saint Peter's Cathedral on Aug. 9 of the same year. He was rigid as a disciplinarian, strenuous as a worker, and eloquent as a speaker. Several clerical books were published by him, including "Manual of Politeness." He died Aug. 20, 1914.

PIZARRO (pī-zär'rō), **Francisco,** soldier and conqueror of Peru, born in Truxillo, Spain, about 1471; slain June 26, 1541. He was a son of Gonzalo Pizarro, a distinguished soldier, but his education was entirely neglected and he was not even taught to read or write. His first employment was that of a swineherd, but later he abandoned this uncongenial work and embarked at Seville to seek a fortune in America. He engaged in several military exploits in Panama and accompanied Balboa on his expedition across the isthmus to discover the Pacific



(Opp. 2228)

POPE PIUS XI.

Pius XI., (formerly Cardinal Achille Ratti), pope of Rome, born at Milan, Italy, May 30, 1857. He was educated for the priesthood in his native city, where he afterward became a teacher, and for twenty years was associated with the Ambrosiana Library, beginning in 1888, and in 1908 became the head of that institution. In 1914 he was made prefect of the Vatican Library in Rome, serving four years, when he became the papal representative to Poland. He was made archbishop of Milan in 1921, and soon was elevated to the position of cardinal. On Feb. 6, 1922, he was chosen pope to succeed Pope Benedict XV. His election to the papacy was hailed with much favor by those who supported the *rapprochement* policy of Benedict XV., which aims to establish cordial relations with the government of Italy.

Ocean. The rumors that a country toward the south possessed gold and silver in abundance kindled his ambition to conquer it.

He organized a company in partnership with Diego de Almagro, an experienced adventurer, and in 1524 proceeded southward as far as Quemada Point. Later the two adventurers were joined by Hernando Lueg, and an agreement was formed that the wealth discovered should be divided equally among them. The expedition proceeded southward by two ships and in the latter part of 1526 they discovered Peru, but their force was insufficient to conquer the Peruvians. Pizarro returned to Panama and thence sailed to Spain, where he induced the government to place an adequate force at his disposal, with which he reached Panama in 1531. In May, 1532, he landed at Tumbez, Peru, with three vessels and about 200 men and at once began the march inland. Cuzco was the capital of the Peruvian empire, where the Inca Atahualpa was captured, and after a ransom of several million dollars had been extorted he was treacherously assassinated.

An extended quarrel arose between Pizarro and Almagro for the possession of the territory, the latter claiming the title of governor of Cuzco. In a protracted civil strife that resulted, Almagro was captured and, in 1537, he was strangled. Pizarro next proceeded against the followers of Almagro with great cruelty, but a conspiracy was formed for his assassination, and this was finally brought about by a son of Almagro in the palace of Lima. Pizarro is a prominent figure in the conquest of a large part of South America. He is the founder of the city of Lima, which he platted in 1535, and in the cathedral of that city his remains are preserved. Brave and resolute, he pushed forward the conquest of the new world with a spirit that only physical endurance and perseverance can make at all possible, though writers generally describe his treatment of the Incas and his opponents as extremely cruel.

PIZARRO, Gonzalo, soldier and adventurer, born in Truxillo, Spain, about 1506; slain April 8, 1548. He was a half-brother of Francisco Pizarro, became a soldier at an early age, and joined the expedition organized by the latter for the conquest of Peru. He was given command of an army of 350 Spanish soldiers and a large number of Indians, and was appointed governor of Quito in 1540. Many of his soldiers perished in the icy winds in endeavoring to cross the Andes while marching toward the east, but, after enduring many hardships, he descended the eastern slopes and discovered the Napo River, a large tributary of the Amazon. While there he and his army were reduced by a lack of supplies, and fully 2,000 of the Indians accompanying him died. After two years of absence he returned to Quito. Soon after the assassination of Francisco he raised an army to dispossess Blasco Nuñez, who had usurped

power as viceroy. In a battle that followed Nuñez was slain, but in 1548 Pizarro was defeated in a battle near Cuzco. He was taken prisoner and soon after was beheaded.

PLAGUE (plāg), or **Glandular Pestilence**, an epidemic disease attended by violent fever. It is characterized by burning carbuncles in the glands of the groin and armpits from which it is sometimes called the *bubonic plague*. In general, it is now believed to be almost identical with the most severe forms of typhus fever. It is produced by the absorption of a poison generated by decaying animal matter combined with heat, moisture, and bad ventilation. Its spread is hastened by humid heat, poor sanitary regulations, and insufficient water, food, air, and light. The plague has been generated in many regions by the famines caused by the ravages of locusts and the poisonous infection of the air resulting from the decay of their bodies. Persons exposed to it become seriously affected within a few hours to three weeks, and, like other malignant fevers, it has various stages, death resulting within a period of a few hours to three days. Patients who survive the fifth day usually recover under favorable medical treatment.

The first symptoms are restlessness, followed by shivering, rise of temperature, and serious pain in the head and back. Glandular swellings appear in about 24 to 36 hours, these being mostly in the neck, groins, and armpits, and after breaking open give rise to suppuration and the oozing of blood from the surface. The disease is highly contagious. No remedy has proved reasonably successful, the best preventive being to avoid the disease by careful observation of wholesome sanitary rules. Many proofs can be cited that the plague ravaged different countries in most ancient times, the first on record in Europe being in Athens in 430 B. C. Josephus recorded a disastrous plague in Jerusalem in 72 A. D., and in 164-180 it spread over a large part of the Roman possessions. Another widespread plague visited Rome in 262, when the daily mortality was 5,000 persons. It appeared in most of Europe as a result of the Crusaders returning from Asia, when it became known as the *black death*. In the period from 1347 to 1350 about one-half the population of Europe was destroyed.

The city of London has been particularly unfortunate in being visited by the plague. Estimates place the loss of lives at London in 1603 at 36,270; in 1625, at 35,500; in 1636, at 13,485; and in 1665, at 68,650. Other notable ravages of the plague cost Marseilles 60,000 lives in 1720; and Messina, 43,500 in 1743. In 1771 it visited Russia, the Scandinavian peninsula, Germany, and many other regions of Europe. A disastrous plague appeared in Egypt in 1844, and another raged in southeastern Russia, Arabia, Persia, and Tripoli in 1878-79. The improvements effected within recent times in the

sanitary regulations of cities, such as supplying pure water, extensive sewerage systems, and adequate lighting of buildings, have had wholesome effects in preventing the appearance of the plague. It is likewise counteracted by additional hospital facilities and advancement in medical science.

PLAIN, one of the great natural divisions of the land, the others being plateaus and mountains. The term plains includes all portions of land areas that are less than 1,000 feet above sea level, while the remaining portions of the land masses are usually classed as plateaus and mountains, though some writers extend the name to include level or undulating regions of greater altitudes. Many of the great plains are adjacent to the coast, rising gradually from the sea and extending inland until they merge into plateaus. North America has two extensive plains, extending north and south through the continents, being divided a short distance south of the Canadian line by the Height of Land. The portion lying north is included in the Arctic plain and the part lying south, extending from Minnesota to the Gulf of Mexico, is almost entirely in the Mississippi basin. Along the Atlantic coast is a narrow coastal plain, which is separated from the Appalachian Mountains by the Piedmont plain. On the western coast of North America the plain is very narrow or entirely absent, the land rising quite abruptly from the shore and merging into the Coast Range and other mountains.

The largest of the extensive plains is in the northern part of Eurasia, being included chiefly in Siberia and European Russia. It is comparatively narrow in the eastern part, where ranges of the Stanovoi Mountains trend near the shore of the Arctic, but it gradually widens toward the west, where it includes a large part of Germany and Austria-Hungary. Much of the interior of Africa is included in the central plains, such as the Sahara and the Sudan. The great plains of South America are in the basins of the Amazon and the Rio de la Plata, but the former is much the larger and more important. Australia is principally an elevated plateau, and the only plain of considerable extent is in the basin of the Murray and the region of the lakes in the southern part. Many great plains formerly were the beds of lakes or the floors of shallow seas, hence these are commonly called *marine plains*. Other plains were formed by various causes acting through long periods of time. Lowlands covered with ice and snow, as in Greenland, are usually called *ice plains*. Those formed by the extensive outflow of lava, as in southern Idaho, are designated *lava plains*. Where large rivers build broad tracts of land by the deposit of silt, as in the deltas of the Ganges and the Mississippi, they give rise to *flood* or *fluvial* plains. The lowlands that have been above the sea for a long period, as a great part of the Sahara, are acted upon by the

winds and other climatic conditions causing erosions, and thus finally develop into what is known as *plains of inundation*.

The great plains are highly important to man in commerce and the industry, since the soil in most cases is highly fertile. This gives rise to agricultural development, which is confined largely to the regions classed as plains. This circumstance, together with the fact that they contain the most important navigable streams and have a surface well adapted to the building of railways, has caused them to contain the greatest density of population. Extensive fields of bituminous and lignite coal and deposits of lead, zinc, and iron ores are among the minerals. Large areas are covered with valuable forests and extensive regions are noted for their growth of blue grass, blue stem, and other nutritious grasses.

PLAINFIELD, a city of New Jersey, in Union County, twenty miles southwest of New York City. It is on the Central of New Jersey Railroad and is a favorite place of residence of many New York business men. The noteworthy buildings include the public library, the city hall, the high school, and the Muhlenburg Hospital. Among the manufactures are clothing, carpets, oilcloth, carriages, printing presses, dye, machinery, cigars, and edged tools. The surrounding country is agricultural and fruit growing. It was settled in 1684 and organized as a city in 1869. Population, 1920, 27,700.

PLANE, in geometry, a real or imaginary surface in which, if any two points are taken, the straight line which joins them lies wholly in that surface. *Plane geometry* treats of the nature and properties of figures and *plane trigonometry*, of plain triangles, or those which lie entirely in the same plane.

PLANE, a tool used by carpenters and joiners for cutting the surface of wood, either to make it smooth or have the shape correspond to that of the cutting edge of the plane. Planes used to cut only flat surfaces are called *bench* or *surfacing planes*, while those for shaping and forming are known as *grooving* or *molding planes*. They are formed of a solid block of hard wood, called the *stock*, which has a wedge-shaped hole cut from the upper to the lower side, in which is adjusted the plane iron or chisel. A wooden wedge is used to secure or fasten the chisel, which is kept sharp for cutting. A handle of wood or iron is attached to the back part of the plane, thus enabling the workmen to push it with force when in use. *Jack planes* are about fifteen inches long and are used for the rougher work, while *jointers* are from two to six feet in length and serve in giving straightness and accurateness to the surface.

PLANETOID (plăn'ët-oid). See **Asteroid**.

PLANE TREE, a genus of forest trees which are generally known as *buttonwood*. A number of species are widely distributed. The

buttonwood native to North America is one of the largest deciduous trees in the continent and is found in the forests skirting the rivers of the central part. Along the Ohio River the trees of this class have a diameter of from ten to fourteen feet and are without branches to a height of from fifty to seventy feet. The leaves are palmate and alternate and the wood is fine-grained. When seasoned, it assumes a dull red color and takes a good polish, but its liability to decay when exposed to the weather renders it of comparatively small value for many purposes. The plane tree of Europe is quite similar to that of North America and was a favorite among the Greeks and Romans for ornamental and shade purposes. It is still planted in many European cities, fine specimens of it being numerous in Constantinople, Rome, Vienna, Berlin, London, and Paris. The plane tree thrives best in an alluvial soil when well watered.

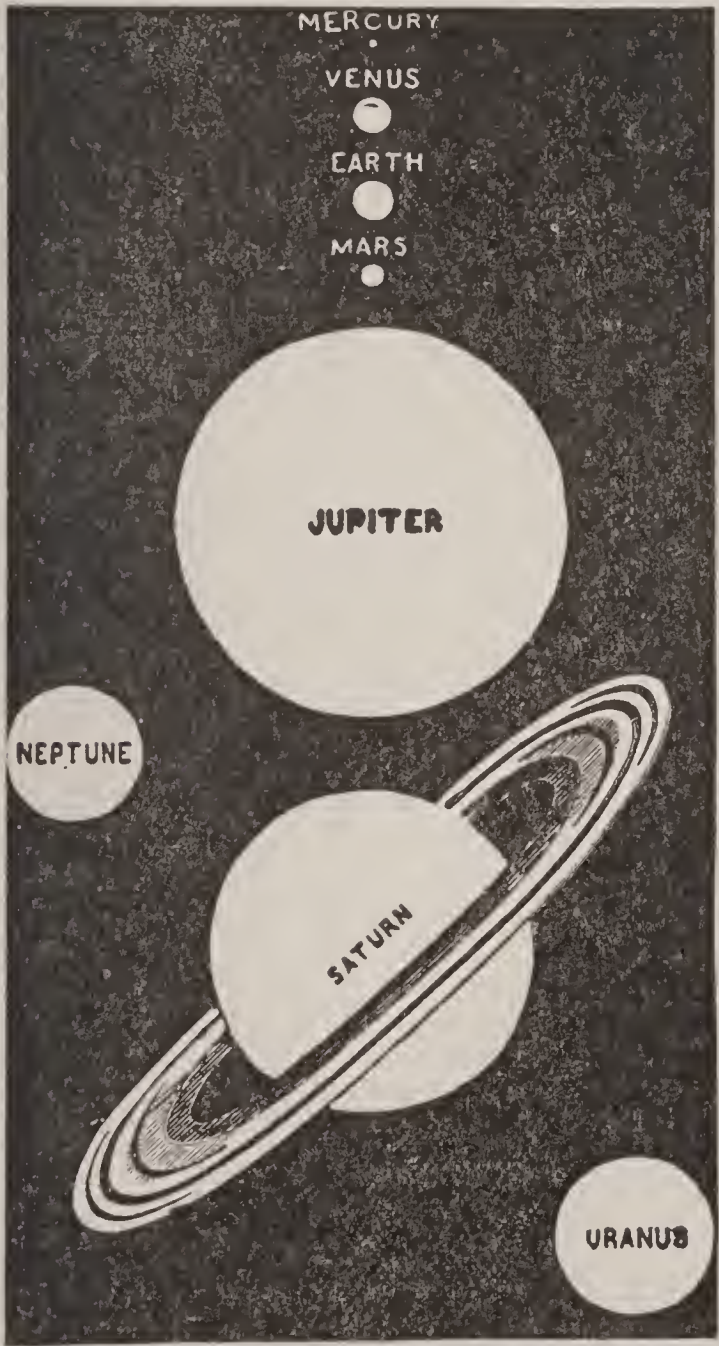
PLANETS, the celestial bodies that revolve around the sun and receive light and heat from it. They are divided into primary and second-

bodies and the light they give off is merely reflected sunlight. Both shine with a steady radiance. The fixed stars give off a twinkling light, but the planets appear brighter than most stars, because they are nearer to the sun and to us. The planets are usually divided into inferior and superior, the *inferior planets* being Mercury and Venus, whose orbits are within that of the earth, and the *superior planets*, Mars, Jupiter, Saturn, Uranus, and Neptune, whose orbits are greater than the earth's orbit. Those named above are classed as *major planets* to distinguish them in reference to their great mass, the regularity of their arrangement, and their nearly circular orbits. The *minor planets* include several hundred bodies which are invisible to the naked eye. They revolve around the sun between the orbits of Mars and Jupiter.

Only five of the major planets were known to the ancients, namely, Mercury, Venus, Mars, Jupiter, and Saturn; the earth was not classed as a planet at that time. William Herschel discovered Uranus in 1781. The existence of Neptune was determined theoretically by John C. Adams (1819-1892) and Leverrier, under the so-called Bode's Law, but it was discovered by Galle, in 1846. Mercury, Venus, the earth, and Mars resemble each other in some respects, particularly in their size, density, and weight. Jupiter is the largest of the planets and is about 1,200 times greater in volume than the earth. In 1859 M. Lescarbault, a French physician, claimed to have discovered a planet which was afterward named Vulcan, but astronomers do not generally admit the existence of such a body. The writers who claim that such a planet exists estimate the distance from the sun at 13,000,000 miles and its periodic time or year, at twenty days. All the major planets are treated in special articles.

Below is a table showing the important features of the major planets:

NAME.	Mean distance from the Sun in millions miles.	Mean diameter in miles.	Sidereal period in days.	Axial revolution in hours, minutes and seconds.	No. of Satellites.
Mercury.....	35.5	3,200	87.96	Uncertain	0
Venus.....	67.2	7,700	224.70	Uncertain	0
The Earth.....	92.9	7,925	365.25	23 56 4	1
Mars.....	139.8	4,300	686.95	24 37 22	2
Jupiter.....	475.5	86,000	4,232.58	9 55 ..	7
Saturn.....	886.0	71,000	10,759.22	10 14 24	9
Uranus.....	1,781.9	31,900	30,686.82	Uncertain	6
Neptune.....	2,751.6	36,750	60,181.11	Uncertain	1



COMPARATIVE SIZES OF THE PLANETS.

ary, the former revolving around the sun and constituting the planets proper, while the latter pass around the primaries and are known as *satellites*. Both planets and satellites are dark

PLANTAGENET (plăn-tăj'ê-nět), the surname of a line of kings of England, who occupied the throne about 300 years. The name is thought to have originated from Geoffrey, Count of Anjou, who wore a sprig of bloom (*plante de genet*) in his bonnet. He married Maude, a daughter of Henry I., and thus became the founder of the Plantagenet dynasty. The first representative on the throne was

Henry II., who succeeded the Norman dynasty in 1154, and Richard III. was the last, being succeeded in 1405 by a representative of the house of Tudor. The different kings reigned as follows: Henry II., in 1154-1189; Richard I., in 1189-1199; John, in 1199-1216; Henry III., in 1216-1272; Edward I., in 1272-1307; Edward II., in 1307-1327; Edward III., in 1327-1377; Richard II., in 1377-1399; Henry IV., in 1399-1413; Henry V., in 1413-1422; Henry VI., in 1422-1461; Edward IV., in 1461-1483; Edward V., a youth of thirteen, who died in the Tower in 1483; and Richard III., in 1483-1485. The Plantagenet family was divided into the Lancaster and York branches in 1400, the former being known as *Red Rose* and the latter as *White Rose*, and from their union in 1485 the house of Tudor originated. See *Roses*, *Wars of the*, and the articles treating of the above kings.

PLANTAIN (plăn'tân), a genus of plants distributed abundantly in all parts of the world. They include about 100 species and are most abundant in the temperate regions. Many of them form common weeds. The *greater plantain* is widely distributed in the United States and Canada. It is a perennial with broad leaves



PLANTAIN.

and cylindrical spikes, bearing a large number of seeds of value as bird food. The spikes are gathered in many countries for their seeds, which are used for feeding caged birds. The roots and seeds are employed for treating wounds and in a preparation for dysentery and diarrhoea.

PLANTAIN, a class of tropical plants allied to the banana, which are native to the East Indies. The plants consist of long, overlapping leafstalks, and bear a stem from four to twenty feet high. The leaves in several species grow to a length of six feet and a breadth of two feet, and the fruit is delicious and thoroughly wholesome. It grows in clusters weighing from forty to sixty pounds, each separate plantain

of the cluster being about one inch in diameter and somewhat longer than a banana, differing from the latter in not having purple spots on its stem. When roasted and eaten before maturity, it resembles the potato in taste, and the powdered dried fruit is quite similar to that of rice. Many inhabitants of tropical regions subsist almost entirely on this fruit. Several species are particularly valuable for the fiber of the leafstalks. The *abaca* or *Manila hemp* is derived from a species of the banana and the plantain and is one of the finest and strongest fibers known. It is used largely in making cloth and cordage. Medical properties are derived from the root. The sap is useful in treating cholera.



PLANTAIN TREE.

PLANTS, the organized bodies endowed with vegetable life, which differ from animals in the important respect that they have neither feeling nor voluntary motion. The higher forms of plants have a root, a stem, leaves, flowers, and fruit, though there are noted modifications of these. In the lowest forms plant life may be reduced to a single cell. Besides, in the lower members of the vegetable and animal kingdoms it is quite difficult to distinguish a plant from an animal, as some of the mimosas that are sensitive to touch, but are classed as plants, while the sea anemone is an animal, but it is firmly fixed to a particular place. A study of nature reveals to us that no abrupt transitions in forms of life occur. For this reason it is strictly in line with nature's laws that the humbler members of the two kingdoms should be closely allied. It was long a debatable question whether sponges are animal or vegetable forms, though now they are considered compound animals, while many of the infusoria that once ranked as animals are now classed as plants.

Plant life generally subsists upon nourishment taken directly from the mineral kingdom, but there are notable exceptions in the parasitic plants that subsist on the juices of other plants, while animals take in nourishment principally through the intervention of plants or other animals. It is quite probable that the vegetable and animal kingdoms had their beginning with forms similar to those resembling both, and that through successive generations a great divergence resulted which finally brought forth forms unlike each other and vastly different from the original. That both kingdoms are interdependent may be observed in the different elements



(Opp. 2232)

HOTHOUSE PLANTS.

1. Belladonna Lily; 2. Clivia Amaryllis; 3. Gloxinia; 3a. Flower; 4. Achimenes; 5. Aristolochia; 6. Passion Flower; 6a. Vine of Passion Flower; 7. Tillandsia.

required for successful growth. Plants on the one hand require an atmosphere laden with carbonic acid, and in taking in this essential element they constantly throw off oxygen, while animals depend on constantly breathing oxygen and giving off carbonic acid. The atmospheric conditions are at present so fittingly adjusted to both forms of life that it would be quite impossible for either to exist for long periods of time without the other, and that these conditions were not always so is demonstrated by the beds of coal and other strata deposited in the Carboniferous Age. The cross fertilization of many species of plants depends upon the work of birds and insects which carry the pollen from flower to flower.

The life of both plants and animals depends upon light, moisture, temperature, and gravitation, but plants need also fertile soil. *Chlorophyll*, the green coloring matter of plants, is due to sunlight. The heat required to mature plants is dependent upon the character of the plants themselves, and they may not only be naturalized in different soils and climates under natural laws, but they may be artificially propagated and improved by the agency of man in countries far remote from their nativity. The law of gravitation causes the roots of plants to grow downward and the stems upward, but moisture largely modifies the growth and direction of the roots. As a general rule, the roots are equal to the branches in strength, since the action of the wind would otherwise cause the larger plants to fall. In a soil moist at the top the roots usually are near the surface, and in soil moistened only to a limited extent near the surface they penetrate farther downward, though these are conditions governed quite largely by the nature of the different kinds of plants.

The organs of a plant are its root, stem, and leaves. The *root* is divided into smaller branches called *rootlets*. The *stem* is the part that grows upward and bears the leaves and flowers. *Leaves* are either opposite or alternate and constitute the foliage. Flowers, fruit, and seeds are the organs of reproduction. Plants are classed as *annuals*, *biennials*, or *perennials*, and in structure may be herbs, undershrubs, shrubs, or trees. *Evergreen* plants retain foliage the entire year, while *deciduous* plants shed their leaves at a certain season. The assimilative power and growth of plants are suspended in winter, and in this respect plant life resembles the hibernation of animals. The closing of flowers and the folding of leaves at night in some plants suggest their sleep. That this is an essential element has been successfully demonstrated by keeping an electric light constantly near a plant, thereby causing it to ultimately lose its vigorous growth. Plants, like animals, sooner or later die, but propagate their kind by the production of the germs of new life. The number of known plants has been estimated by writers to include from 115,000 to

120,000 well marked species, but the actual number is probably much greater.

PLASTER OF PARIS. See **Gypsum**.

PLATA (plă'tà), **Rio de la**, an extensive estuary of South America, situated between Argentina and Uruguay, formed by the Uruguay and Paraná rivers. The breadth at Buenos Ayres is 29 miles and at its entrance into the Atlantic, between Maldonado and Cape San Antonio, 150 miles. It is 200 miles long, but in many places shallow water hampers navigation. An immense volume of water is carried through the estuary, since the drainage comes from an area of 1,250,000 square miles, and about one-fourth of the produce of South America is shipped through it. The principal cities and ports on its banks are Buenos Ayres and Montevideo. Juan Diaz de Solis first discovered it in 1515, but its present name was given to it by Sebastian Cabot. Floating islands are met with at some distance in the sea and at several places in the estuary.

PLATAEA (plă-tě'à), a city of ancient Greece, about six miles south of Thebes, in Boeotia. It had a fine site at the foot of the northern slope of Mount Cithaeron, and between it and Thebes the Asopus River formed a natural boundary. The city is thought to have been built by the Thebans, but there was continual strife between the two territories. In 519 B. C. the Plataeans formed an alliance with Athens, and in 480 B. C. their city was destroyed by the Persians because they had assisted the Athenians in the Battle of Marathon. The following year Aristides and Pausanias won a victory over the Persians at Plataea, in which the latter under Mardonius were completely scattered. It was besieged by an army of Spartans and Thebans in the Peloponnesian War, and, after defending itself for two years, was compelled to surrender in 427 B. C., when the city was destroyed and a large number of the people were slain. Those escaping found safety in Athens, but later returned to rebuild the city. Plataea had considerable importance as late as the 6th century A. D. Its ruins are near a village called Kokhla.

PLATEAU (plă-tō'), an elevated tract of land, ranging higher than a plain. The large surfaces known as plateaus are associated more or less closely with systems of mountains, located either between the upper ranges or extending as highlands from the foothills. The plateaus of Asia, especially Tibet and Pamir, are the most extensive and highest in the world. Next to these range the Andean plateau of South America and the Rocky Mountain plateau of North America. In Central Asia the land masses have a general altitude of from 10,000 to 14,000 feet, but these are cut deeply by the streams. The Colorado plateau, located between the Sierra Nevada and the Rocky Mountains, ranges in height from 6,000 to 9,000 feet, while the plateau known as the Great Plains, located

in the western part of the Mississippi valley, immediately east of the Rocky Mountains, is from 3,000 to 6,000 feet above the sea level.

The arid regions are confined largely to the plateaus, owing to the fact that the surrounding mountains interfere with precipitation. These are frequently cut by canyons into tablelands, or by streams so as to form bluffs, as in the Bad Lands of North Dakota and South Dakota. In other localities the surface is sculptured by denudation so as to resemble mountains, as the Catskills of New York. The soil of many plateaus is highly fertile, but the larger regions of this class are included in the arid belt, hence the soil is too dry to produce without irrigation. However, the streams are usually in deep channels, hence it is difficult to conduct water to the general levels by artificial channels. Many high plateaus have an abundance of rainfall, hence are covered with nutritious grasses or valuable forests, as in the western part of Canada and the United States.

PLATING. See **Metallurgy**.

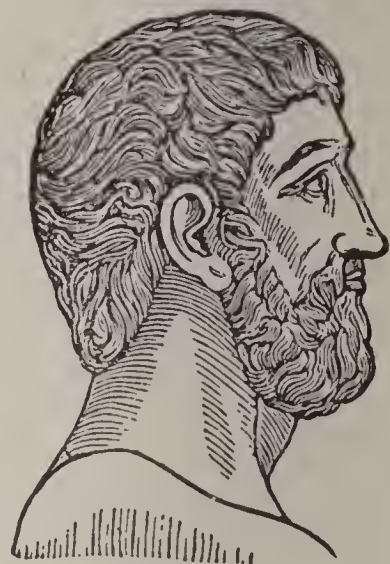
PLATINUM (plăt'ī-nŭm), a grayish-white metal found in the metallic state in rounded granules distributed through sandy deposits, and alloyed with the platinum metals. In the native state it occurs only in small, irregular grains from the size of a pinhead to that of a pigeon's egg, though there are instances in which the deposits have weighed as much as twenty pounds. However, the native platinum is not pure, and, besides containing traces of gold, iron, and copper, it is alloyed with several other metals which it resembles in certain properties, which are called the *platinum metals*. These embrace iridium, paladium, rhodium, ruthenium, and osmium. It is very heavy and is separated from sandy deposits by washing in a stream of water in the same manner that gold is separated from sand. Platinum is very malleable and ductile, has a brilliant luster, and, while the heaviest of ordinary metals, is least expanded by heat. Its high degree of infusibility and resistance to the action of chemical reagents makes it a valuable metal for vessels used in chemical laboratories, where evaporating dishes, crucibles, and capsules are used that are made chiefly of platinum. It enters largely into the stills used in evaporating sulphuric and nitric acids.

The alloys of platinum are not numerous, but with silver it forms a fusible white alloy, which, however, blackens by working and is attacked by nitric acid. It melts in the oxyhydrogen flame and in the electric furnace. At a white heat it becomes soft and can be forged and welded like iron. The air does not affect it at any temperature. Its principal use is for apparatus in the chemical laboratory and all this apparatus is made as thin as is consistent with strength, for the metal is quite rare and costly. Its property of resisting the effects of ordinary heat renders it of value in electrical

supplies. The platinotype process in photography, discovered within recent years, has opened a wider field and a larger demand. Platinum is found in various parts of the United States, but Trinity and Shasta counties in California have been the principal sources of supply. It occurs in Oregon, Canada, Peru, Brazil, Colombia, the West Indies, and Borneo.

PLATO (plă'tō), famous Greek philosopher, born in Athens in 429 B. C.; died there in 347 B. C. He was the founder of the first of the four great schools of philosophy, which was called the *Academic school*; while Aristotle founded the *Peripatetic*; Epicurus, the *Epicurean*; and Zeno, the *Stoical*. His early life is not known, but it is certain that he was carefully educated from the fact that he was connected by his mother with Solon and by his father with Codrus, one of the kings of Athens. His education embraced gymnastics, music, and literature, and his first efforts were devoted to poetry, but when twenty years of age he became a student under Socrates, who influenced him by his teaching to embrace philosophy as a study. He was a favorite pupil of that great teacher, and appears to have been with him much of the time until his death, in 399 B. C. It is quite certain that Plato took part in at least three great battles, but made no serious attempt to enter political life, rather preferring to teach the doctrines of government than enter into official positions.

After the death of Socrates, he and other disciples of that teacher took refuge in Megara for some time, but later he made an extensive tour through Lower Italy, Sicily, Cyrene, Egypt, and Asia Minor for the purpose of improving his mind. Other journeys are attributed to him by various writers, but it is not certain that accounts of them are more than traditional. These journeys include one to Sicily, in which he is credited with coming into relationship with the younger Dionysius; and one to Palestine, Persia, and Babylon, where he is said to have studied the wisdom and philosophy of the East. He returned to Athens about 388 B. C. and began his teaching in the Academy, a beautiful park in the western part of the city, so named from Academus. The profound topics which he treated were enlivened by wit, fancy, humor, and picturesque illustrations. His style was considered so perfect that an ancient said of him: "If Jupiter had spoken, he would have spoken like Plato." The Academic Gardens were thronged by the populace of Athens to listen to the speeches of the master.



PLATO.

Though the Athenian women were excluded from the intellectual groves, yet they shared in the universal eagerness, and, disguised in male attire, stole in to hear the philosophy of Plato. His instruction was given without remuneration and his support seems to have come almost entirely from the inheritance received from the estate of his parents. Among the many noted disciples of Plato was Aristotle.

Plato made use of the methods of teaching that had been employed by Socrates, and like him held that the end of philosophic teaching is to lead the mind of the inquirer to discover truth, rather than seek to impart it by making statements without giving evidence, or by employing positive assertions. This inductive method was so formed that general definitions were reached by systematic conversational forms. The writings of Plato are classed as "Dialogues" and "Letters," though the latter are not generally admitted as genuine. The "Dialogues" are generally accepted as coming from Plato, but the exact order in which they appeared has not been established. Schleiermacher and Hermann have prepared chronological sections, but these two scholars differ somewhat in their constructive arrangement. According to the former there are three sections of the "Dialogues."

The most important works in the first division include "Phaedrus," "Parmenides," "Protagoras," "Laches," "Lysias," "Charmides," and "Euthyphron"; in the second, "Sophistes," "Theaetetus," "Politicus," "Phaedo," "Philebus," "Meno," "Gorgias," "Euthydemus," "Cratylus," and "Symposium"; and in the third, the "Republic," "Timaeus," the "Laws," and "Critias." The "Dialogues" of Plato contain his philosophical teaching, but aside from this they are of great literary value and embody the highest perfection attained in Greek prose. The author idealizes Socrates as one of the speakers, and he is made to represent to the student the philosophy of the early Greeks and the systems taught by the different teachers. This plan is followed not only for its historical value, but in it Plato analyzes the opinions of the different philosophers, thus bringing his student in contact both with historical and philosophic themes.

As a whole, the philosophy of Plato comprises a grand effort of the mind to compass the problem of life. He is the first to divide philosophy into the three branches of physics, ethics, and dialectics, and his disciple, Xenocrates, was the first to apply these names. The "Phaedo" treats mainly of the doctrine of the immortality of the soul, and Plato is perhaps best known by this doctrine. He believed in one eternal God, without whose aid no man can obtain wisdom or virtue, and in a present as well as a future existence. Since he held that the soul has an existence before the body, he thought that all earthly knowledge is but the recollection of ideas gained by the soul in its disembodied state, and,

as the body is only a hindrance to perfect communion with the eternal essence, it follows that death is to be desired rather than feared. These ideas he understood to be the perfect patterns of intelligence and virtue that were common to the soul in its existence before the body, and, since they existed as perfect types of the original intelligence from all eternity, they cannot be perceived by human intelligence. After leading his disciples to discover the realm of ideas, he induced them to follow him in surveying it throughout. The highest forms he regarded as justice, beauty, and virtue, and the dominant principle of the whole realm is the idea of the good. He harmonized intelligence with goodness, and this constitutes the aim of his philosophy.

The "Republic" is one of his best known writings. It is a work on public education, in which he also presents the elements of an ideal commonwealth. Both his system of education and that of a republic are ideal, and in both the individual and the family are sacrificed to the state. Education is to fit every individual to become a part of the state. All are to receive not only an intellectual and artistic culture, but to acquire physical perfection by training in gymnastics. The "Laws" is the work of his old age, in which much of the radical element expressed in the "Republic" is qualified. He renounces the distinction of social caste, and gives a practical and minute application of education to all children without distinction of classes. The end of education he sets forth in this excellent definition: "A good education is that which gives to the body and to the soul all the beauty and all the perfection of which they are capable." While the "Republic" is a work of pure imagination, the "Laws" forms a commentary on the actual state of practice. In both we find what was nearest the soul of Plato—the constant search for a higher morality.

PLATT, Orville Hitchcock, public man, born in Washington, Conn., July 19, 1827; died April 21, 1905. He studied at an academy and in 1849 was admitted to the bar. For some time he practiced his profession at Meriden. He was elected to the State senate of Connecticut in 1855, became secretary of State in 1857, and was again elected to the State senate in 1861. For four years he was a member of Congress, beginning in 1865, and was elected United States Senator in 1879. He served in the Senate about 25 years, and wrote the famous Platt Amendment, which was made a part of the constitution of Cuba.

PLATT, Thomas Collier, public man, born in Oswego, N. Y., July 15, 1833. He studied at Yale University for some time, but owing to ill health discontinued work there in 1853. Later he resumed study at Yale, where he received a degree in 1876. Soon after he became president of a national bank in Tioga, N. Y., and engaged in large lumbering enterprises in Michigan. He

was elected to Congress as a Republican in 1872, was reelected in 1874, and in 1881 he succeeded Francis Kernan as United States Senator. In the same year both he and Senator Conkling disagreed with President Garfield in regard to Federal appointments and resigned, and both failed of reelection. In 1880 he became president of the United States Express Company, and in 1897 was again elected to the United States Senate. He died Mar. 6, 1910.

PLATT-DEUTSCH (plät'doich), or **Platt-German**, a German dialect spoken in North Germany, principally in the lowlands from Russian Poland to the boundary of Holland. It is popularly called *Low Dutch* by English-speaking people, and is a distinct language that came down to the present time from the Old Saxon. The Flemish and Dutch languages are classed with the Low German, but, since they have a considerable literature and are associated with different political governments, they are usually regarded as distinct languages. They include a number of different dialects, but all of them show a remarkable agreement with the Dutch, German, Flemish, English, and Scandinavian in their system of consonants. Formerly the Low German was spoken in a large region south of the North Sea, particularly before the Reformation, but since then the High German has steadily superseded it as the modern classical language. The High German is now taught in the schools and the Low German is spoken in the home of the peasants, but the former is gradually gaining territory. A literature of much interest has been written in the Low German and within recent years it has been enlarged and popularized by Fritz Reuter and Klaus Groth.

PLATTE (plät), a river formed at North Platte, Neb., by the confluence of the North Platte and South Platte rivers. After a course of about 400 miles toward the east it joins the Missouri at Plattsmouth. Both the North and South Platte rivers rise in the Rocky Mountains, the former having a length of about 800 miles and the latter about 500 miles. The channels of these rivers are wide and sandy, and during the melting of the snow on the mountains, in May and June, they are well filled with rapidly flowing and sand-colored water, but in the other seasons of the year extensive sand bars appear. Neither of these rivers is navigable. The entire basin of the Platte includes about 300,000 square miles. Its valley is broad and fertile in the eastern part, but in the foothills and mountains are precipitous bluffs on both sides. They are chiefly of a mixed limestone and sandstone formation.

PLATTSBURG, a village of New York, county seat of Clinton County, on Lake Champlain, at the mouth of the Saranac River, 165 miles east of north of Albany. It is on the Delaware and Hudson Railroad and is attractive as a summer resort. The principal buildings in-

clude the public library, the county courthouse, and many churches. It is the seat of a State normal school and of the Roman Catholic Summer School of America. Among the manufactures are flour, wagons, machinery, canned products, and utensils. The surrounding country is agricultural, and contains deposits of iron. It was first settled in 1784. Near by, off Valcour Island, occurred the first naval battle of the Revolution, on Oct. 11, 1776. Population, 1905, 9,898; in 1920, 10,909.

PLATTSMOUTH, a city in Nebraska, county seat of Cass County, on the Missouri River, 21 miles south of Omaha. It is situated immediately south of the Platte River, on the Missouri Pacific and the Chicago, Burlington and Quincy railroads. The place has a large trade in cattle, grain, lumber, and merchandise. It has extensive railroad machine shops. Among the manufactures are carriages and wagons, canned fruits, tobacco products, flour, machinery, and earthenware. The principal buildings include the county courthouse, the high school, the opera house, and many churches. It has public waterworks and sanitary sewerage. Population, 1900, 4,964; in 1920, 4,190.

PLAUN (plou'en), a city of Germany, on the Elster River, 65 miles south of Leipzig. It is situated in a beautiful and fertile valley and has railroad conveniences. The manufactures include muslin, cotton goods, cambric, leather, embroidered goods, paper, and machinery. It has a beautiful palace, a gymnasium, and many educational and benevolent institutions, and is beautified by a number of gardens and parks. The municipal facilities include telephones, electric lighting, and pavements. A large majority of the inhabitants are Protestants. Population, 1920, 121,104.

PLAUTUS (plä'tūs), **Titus Maccius**, noted comic writer and dramatist of Rome, born at Sarsina, in Umbria, about 254 B. C.; died in 184. He probably received his education at Rome, where he studied the Latin language and acquired proficiency in Greek literature. It is thought that he became connected with a dramatic company at Rome and that he later engaged in foreign trade, but, after failing in the latter, he returned to Rome and supported himself in turning a handmill for a baker. His first three plays were composed a short time before the beginning of the Second Punic War, when he was about thirty years of age, and the popular reception accorded to these productions caused him to engage permanently in literary work. After 224 B. C. his time was devoted entirely to literature. He exhibited a wonderful fertility of mind until his death.

Writers credit Plautus with the authorship of 130 plays, but only 20 of them are extant. These plays portray faithfully the life of the middle and lower classes of Rome, and the humor running through them caused them to remain popular for many centuries. They were

played extensively to the time of Emperor Diocletian. Many of his plots and scenes were drawn from the Grecian writers, but he supplied an original language that was commended by Cicero, Varro, and Saint Jerome. Many of the English writers have drawn inspiration from Plautus, among them Shakespeare, Addison, Dryden, and Leslie, and a number of his works have been translated into many of the modern languages. The writings of Plautus extant include "Amphitryo," "Asinaria," "Aulularia," "Captivi," "Curculio," "Casina," "Cistellaria," "Epidicus," "Bacchides," "Mostellaria," "Menaechmi," "Miles," "Mercator," "Pseudolus," "Poenulus," "Persa," "Rudens," "Stichus," "Trinummus," and "Truculentus." These titles have been arranged from a treatise published by Varro, who added another work, entitled "Vidularia."

PLAYFAIR (plā'fâr), **Lord Lyon**, chemist and statesman, born in Meerut, India, May 21, 1819; died in London, England, May 29, 1898. He graduated from Saint Andrews University, Scotland, studied chemistry at the Andersonian University, Glasgow, and returned to India to improve his health. In 1843 he became professor of chemistry at the Manchester Royal Institution, and later was appointed by Sir Robert Peel on the sanitary commission to examine the chief British cities. He had charge of the department of juries at the exhibition of 1851, receiving as a reward a companionship of the Bath, and in 1857 became president of the Chemical Society of London. The following year he was elected to the chair of chemistry in the University of Edinburgh, and in 1868 entered Parliament as a Liberal from the Scotch University, holding his seat for seventeen years. In 1873 he was made Postmaster-General and, after the election of 1880, served three years as chairman of ways and means. He was raised to the peerage as Baron Playfair of Saint Andrews and in 1892 was made a lord-in-waiting. Lord Playfair wrote a number of works on chemistry and educational subjects and edited Liebig's "Chemistry in Its Application to Agriculture and Physiology."

PLAYS. See **Drama**.

PLEASONTON (plēz'ün-tün), **Alfred**, soldier, born in the District of Columbia in 1824; died at Washington, D. C., Feb. 17, 1897. He graduated at the West Point Military Academy in 1844, served with distinction under General Taylor in the Mexican War, and for bravery at the battles of Palo Alto and Resaca de la Palma was brevetted first lieutenant. He served in the regular army until the beginning of the Civil War, and in 1862 was commissioned a major of cavalry. When General Lee invaded Maryland, Pleasonton commanded the cavalry that followed his army. Later he took part in engagements at Boonsboro, South Mountain, Antietam, Fredericksburg, and Chan-

cellorsville. At the last mentioned battle he checked the advance of Stonewall Jackson, thereby saving Hooker's army. Soon after he became major general and took a leading part in the campaign before Gettysburg, for which he was made colonel in the regular army. In 1864 he was transferred to Missouri, where he distinguished himself by compelling the Confederates under General Price to retreat from the State. He became major general in the regular army in 1865, but resigned his commission in 1868. President Grant appointed him collector of internal revenue in the latter year, and later he became president of the Cincinnati and Terre Haute Railroad. He was placed on the retired army list in 1888 with the rank of colonel.

PLEBEIANS (plē-bē'yānz), or **Plebs**, one of the two great classes into which the Roman people were divided, the other being the *patricians*. The latter class held all the offices of the government and enjoyed the privilege of governing the affairs of the nation, while the plebeians were not only denied these, but were forbidden to intermarry. Though the plebeians bore the brunt of fighting, they were denied the right of using the spoils of war. The contest between the two classes for the enjoyment of equal civil rights constitutes a large part of the civil history of Rome. In 268 B. C. the Hortensian law was finally established, under which the two hostile classes were recognized as one general body of Roman citizens with equal rights. This law provided practical equality in the rights of property. With representation of these classes in the legislative branch of the government, the civil rights of both remained practically equal, and later all traces of former distinctions disappeared.

PLEHVE, **Wjatscheslavo Konstantinovitsch von**, statesman, born in Saint Petersburg, Russia, in 1848; died July 28, 1904. He descended from a noble but poor family, and with the aid of wealthy friends was able to secure a general education for a business and public career. For some time he was a minor official in the government, but later became imperial counsel at Warsaw. Under Nicholas II. he was raised to the dignity of procurator at Saint Petersburg and subsequently became assistant minister of the interior. In 1902 he was promoted to the position of minister of the interior, and as such served until the beginning of the Revolution of 1904-05. His administration was efficient and rigid, which caused him to be criticized adversely by the liberal party, and he was assassinated in Saint Petersburg.

PLEIADES (plē'yā-dēz), a beautiful cluster of stars in the constellation Taurus, which is sometimes called the *Seven Sisters*. It contains a large number of stars, six of which are visible to the naked eye. In Greek legends the Pleiades were regarded the seven daughters of Atlas and Pleione, and bore the names Electra, Taygete, Maia, Celaeno, Alcyone, Merope, and

Sterope. Grecian mythology accounts for only six of these stars being visible to the naked eye by asserting that Electra left her place that she might behold the ruin of Troy, which city was founded by her son, Dardanus. Later they all committed suicide out of grief for the death of their sister, and were placed by Zeus as stars on the shoulder of Taurus. These stars were anciently of special interest to the sailors of the Mediterranean, since they rise in Italy about the beginning of May and set about the beginning of November, a period covered also by the navigation of the Mediterranean in the prosperity of Greece.

PLEURA (plū'rà), a thin, moist membrane that lines the cavities of the chest, forming a covering of the external surface of the lungs. It is in the form of an inclosed sac and within is a fluid called the *serum*, which is secreted to prevent friction. The pleura consists of two chambers. A portion of the outside of one sac is closely attached to one of the lungs and its root and the other portion to the inside of its thoracic wall, while the fluid lubricates the pleural surfaces, permitting the lung portion to move smoothly over the thoracic portion. Besides forming a protection to the lungs, it serves to hold it and other organs of the chest in position.

PLEURISY (plū'rī-sŷ), an inflammation of the pleura, the membrane which lines the chest and covers the lungs. This disease has been recognized and described at an early date, although it is quite difficult to distinguish it from pneumonia. Though confined to no period of life, the disease is rare in early infancy and in old age. Exposure to cold, external violence, and the presence of tubercles of the lungs are among the chief causes. Chills, fever, acute pain in the chest, and a dry cough are among the early symptoms. Pleurisy may be *dry*, or *plastic*, or may be accompanied by effusions of a pale, yellowish fluid which closely resembles the serum of the blood. When it is dry or plastic, the membrane becomes more or less congested. In pleurisy with effusion an abnormal amount of serum is secreted, which is sometimes accompanied by the growth of bacteria. The disease is not very dangerous, unless it arises from a constitutional malady, such as tuberculosis. Those having a weak constitution need special care, else they may suffer permanent disability or premature death.

PLINY THE ELDER (plīn'ī), eminent writer of Italy, born at Comum, now called Como, in 23 A. D.; died in the year 79. He was the uncle of Pliny the Younger. At an early age he came to Rome to obtain educational advantages. The wealth and high standing of the family made it possible for him to acquire the most liberal training available in his time. At the age of 23 years he became a commander of a troop of cavalry in the army stationed in Germany and served for some years under L. Pom-

ponius Secundus, of whom he later wrote a biography. In 52 he returned to Rome and studied law. After practicing the legal profession for a short time, he returned to his native town to devote his attention to literary research. Later he was appointed governor of Spain by Nero, where he remained until 71. Soon after he returned to Rome and again pursued literary work. In 73 he adopted his nephew, Pliny the Younger, whose education he directed. He is the author of a large number of works, but only one, his "Natural History," has come down to us. This work was published in 77 and consists of 37 volumes, covering the whole range of the scientific knowledge of his time. He became commander of the Roman fleet and in 79 he was stationed off Misenum, when the great eruption of Mount Vesuvius buried Pompeii and Herculaneum. He was eager to witness this remarkable phenomenon at close range and hastened toward the seat of disturbance, but was suffocated in the vapors caused by the eruption.

PLINY THE YOUNGER, distinguished writer of Rome, nephew of the former, born at Comum, now Como, in 61 A. D.; died in 115. He was the son of C. Caecilius. After the death of his father, he was adopted by his uncle, from whom he inherited a valuable estate and many manuscripts. He was a man of highly cultured talents, possessed great devotion for literature, and, like his uncle, was noted for industry and perseverance. His education was completed under the famous Quintilian, and he began to plead in the quorum when only eighteen years of age. In the year 100 he was chosen consul, was made governor of Pontica in 103, and after two years' service there became curator of the banks and channel of the Tiber. His literary fame rests largely upon his panegyrics on Emperor Trajan and his charming letters. The former is known as the "Eulogium" and the latter as the "Epistles," but he is the author of many other works, though the two mentioned are the only ones extant. He was an associate of Tacitus, the orator and historian. The two scanned and criticized each other's manuscripts, and by their intimacy became so linked to each other that they were jointly remembered in people's wills.

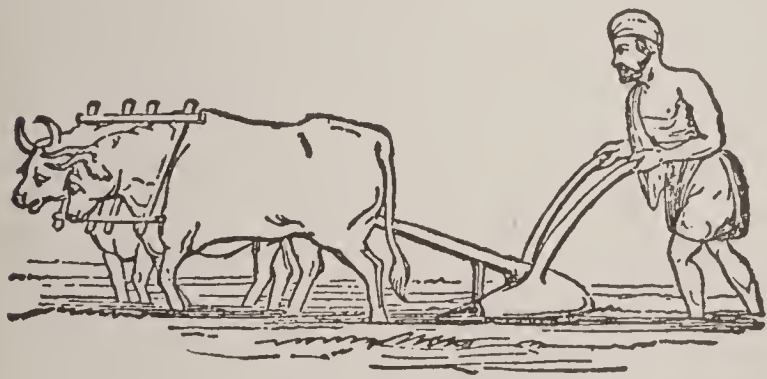
PLIOCENE (plī'ō-sēn), in geology, the last epoch of the Tertiary period, so named because the greater part of its fossil shells belong to the recent species. Some writers apply the term post-pliocene to the more recent deposits in which no extinct species of fossil shells are found, which are below those that contain relics of man. Only small areas of this period are found in North America, but the formations belonging to this epoch are very extensive in Europe.

PLOVER (plūv'ēr), a class of birds frequenting the shore and inland waters of America and Europe. Many of the species are well known, differing in size and color. The *com-*

mon plover has long wings, the points usually projecting beyond the tail. It is speckled above and black or dark brown below. The *gray plover* is native to the Northern Hemisphere and the *speckled plover* is found largely in Europe, where it is known locally as the *golden plover*, a name applied because of its colorings of yellow above. The American *golden plover* has yellowish feathers above and smoky-gray below. It feeds principally on insects or the larva found in marshes, and appears to be very fond of grasshoppers. Other American species include the *green plover*, the *killdeer plover*, and the *stilt plover*. Birds classed with the plovers are found in all the temperate and warmer regions. They fly with rapidity and run swiftly, some species pretending to be injured, with the design of protecting their nest and young from an enemy. The *field plover* is a notable example of this class and is found in many regions of America in cultivated fields, where it feeds on seeds, insects, and berries.

The *ring plover* is a familiar bird in eastern Canada, especially on the shore of Cumberland Bay. It is about eight inches long, nests among the pebbles of the sea, and searches for food near the receding waves. The legs are white, the crown and collar are black, and the general color is white with yellow markings. Another Canadian species, the *piping plover*, ranges southward from Newfoundland. Most of the plovers molt twice a year and the males and females have a very similar appearance. The nests of all species are built on the ground. Some species are regarded of value for their flesh and their eggs are eaten in many countries. They are mostly migratory birds, passing to the higher latitudes in the spring.

PLOW, an implement used by farmers and others for turning over, furrowing, or breaking up the soil. It is drawn by animal or steam



SYRIAN PLOWING.

power. Those designed for ordinary field work are constructed with the view of cutting off longitudinal slices of earth and turning them over so an entirely new surface becomes exposed to the action of the air. Plows of this kind usually have a cutter that cuts off the weeds and stubble so all substances above the surface may be wholly turned under, thus providing the soil with fertilizing substances and exposing a surface well adapted to cultivation and for receiving the seed of a crop to be sown

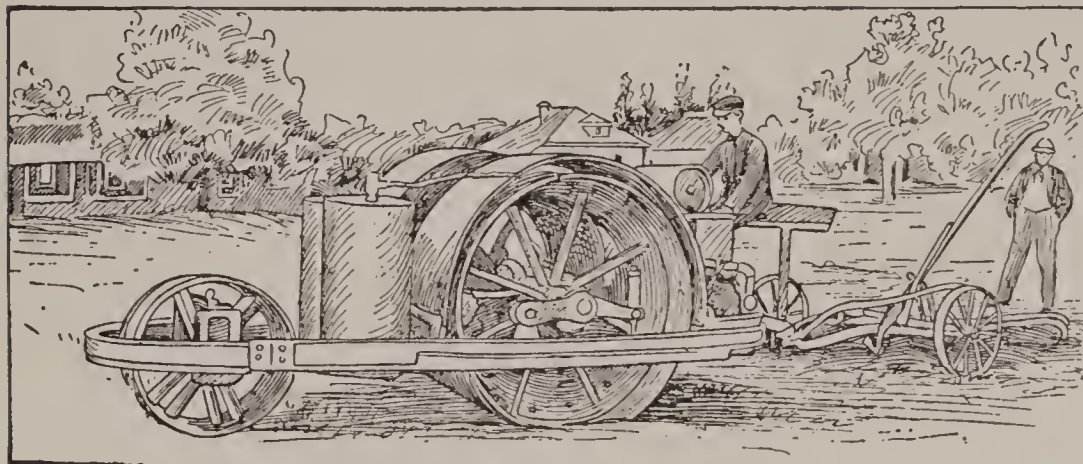
or planted. Plows are mentioned very early in history, though they were formerly of inferior construction, and people little advanced in industrial arts still use illy constructed implements either wholly or partly of wood.

The plows of modern manufacture are almost entirely of iron and steel. The different parts of an ordinary plow include a *share* for slicing the earth at the bottom of the furrow; a *land-side* that presses against the land to aid in guiding the plow; a *standard*, or *sheath*, connecting the share and *moldboard* with the beam; a *beam* by which the plow is drawn; *handles* for the plowman to steady and guide the implement; and usually a *colter* for cutting the furrow slice from the land. Special plows are used for different purposes, such as drain plows, drill plows, subsoil plows, and mold plows. A plow with a double moldboard is used for earthing up potatoes and peanuts and a *turn-wrest* plow is so arranged that the entire field may be turned in the same direction, the moldboard being turned to either side for that purpose. A plow of this character is quite serviceable in hilly regions, where it is often desired to turn the soil toward the sloping direction, and in plowing gardens to avoid the inconvenience of a number of furrows.

Plows of American manufacture have gone largely into use in many countries. They are manufactured of various materials so they may work successfully in different kinds of soil. It is essential that the portions passing through the ground be made of a material that easily cleans itself, or *scours*. A soil containing much sand is turned easily with an inferior share and moldboard, but the heavier clay and gumbo soils require metal of extra quality which is hardened by a process requiring considerable care. Much of the plowing on the larger farms and plantations is now done with implements mounted on wheels, thus avoiding a large part of the friction and enabling the plowman to ride. These plows are drawn by three or four horses and have either one large plow or two or more smaller ones. Steam plows are of modern invention and are used only on farms of the largest size. The plow proper consists of one or two sets of plows attached to an iron frame. Each set consists of two or more plows, sometimes as many as ten, and these are mounted on two or more wheels.

In an early method of plowing by steam the engine was stationed at one side of the field and the plow was drawn back and forth by means of a cable passing through a stationary capstan at the other side. The plows were in two sets, being adjusted so they pointed in different directions, and were raised or lowered alternately so those on the different sides of the wheels plowed only when drawn forward, the others being raised above the surface. Another plan was to have a cable pass entirely around the field which was put in motion by a stationary

engine, and the attached plow passed around the field, continually cutting farther inward as the cable was moved from time to time. However, neither of these proved practicable. Steam plows of modern construction are now employed on the large farms of Canada and the United States, especially in Minnesota, North Dakota, Texas, Manitoba, Saskatchewan, and Alberta. They do the work best where the soil is comparatively level and free from stones. The engines used in plowing may be employed in drawing wagons and driving saws, pumps, mills, and threshing machines at seasons of the year



AN ELECTRIC PLOW.

when they are not needed to do plowing. Plows that are propelled by the agency of a gasoline engine, on the plan of an automobile, are used to some extent. Several forms of plows in which electric power is supplied by a storage battery have been invented, but they are not used extensively.

PLUM, a class of fruit trees belonging to the same genus as the apricot, almond, peach, and cherry. This fruit is cultivated very extensively, especially in the temperate zones. Many species have been described. They range from the small products of cold regions to the large and luscious kinds produced extensively in the temperate and tropical zones. Plums are native to many countries and were found extensively distributed in America at the time of its discovery, though since then other species have been acclimated, and the American trees have been improved more or less by propagation. Among the common species of cultivated plums are the Chickasaw, beach, damson, Damascus, black-thorn, green gage, Cashmere, cherry, and Saint Julien. These differ greatly in size, taste, color, and form, and are alike valuable for different purposes. *Prunes* are made by drying certain kinds of plums, such as the German and Turkish prunes. Others are eaten fresh, preserved, or used in making syrup, vinegar, and alcohol. Plum jellies, jams, and syrups are delicious. Plum wine is valuable for coloring, purifying, refining and mellowing spirits and is made from prunes. The plum tree yields a hard and fine-grained wood which is well adapted for carvings.

PLUMB (plūm), **Preston B.**, statesman, born in Delaware County, Ohio, Oct. 12, 1837;

died Dec. 20, 1891. He studied in the common schools of Ohio and settled in Kansas in 1856. In 1861 he was admitted to the bar, and the following year became a member of the State Legislature. In the same year he entered the United States army, and by valued services rose to the rank of colonel. Soon after the war he became a member of the Kansas house of representatives, of which he was speaker in 1867, and in 1877 was chosen a member of the United States Senate, where he was influential as a Republican until his death.

PLUMMET (plūm'mēt), or **Plumb Line**, an instrument used to fix vertical lines, or lines in the direction of terrestrial gravities. It is of very ancient origin and is referred to in Isaiah xxviii, 17. This instrument consists of a weight, generally of lead, hanging to a string. A square is usually set in a vertical position by a plumb line, the other limb of the square being horizontal, and in this way it is possible to determine both vertical and horizontal lines. In surveying and astronomical instruments

the plummet is sometimes used in fixing and regulating their position, but the *spirit level* is employed more generally. Surveyors usually employ the spirit level to regulate the horizontal position of the compass, and a plummet is used to indicate where a stake or marker is to be fixed in the surface of the ground.

PLUSH, the name of a fabric which is quite similar to velvet, but different from the latter in having a longer pile or shag. Many varieties are manufactured and sold in the market. Some grades are all worsted, while others are worsted with a mohair pile, and still others are of cotton with a silk pile. Mohair and worsted plush is employed in making upholstered furniture and the former enters largely into wearing apparel, such as caps and cloaks. Dresses and hats worn by women and several kinds of hats for men are made of plush with silk pile. France, Germany, and England produce the largest quantities of plush fabrics.

PLUTARCH (plū'tärk), noted biographer and moralist, born in Chaeronea, Greece, about 46 A. D.; died about 117. The dates of his birth and death are uncertain and little of his personal history is known, but it is known that he was a contemporary of Tacitus and the Plinys. It is thought that he studied at Athens in 66 A. D., since he speaks in his writings of Ammonius as his teacher and of Nero invading the country with a Roman army while he was still a student. Later he removed to Rome where he learned the Latin language and came in contact with many noted Roman scholars and statesmen. His lectures on philosophy attracted the attention of large audiences, both in Rome and other cities of Italy, and in the latter part of his life he re-



(Opp. 2240.)

RUMELY STEAM TRACTION ENGINE WITH TWELVE PLOWS.

This machine uses coal for fuel and is capable of pulling twelve plows with facility. A plow drawn by three horses plows an average of three acres per day, while this machine, under favorable conditions, plows about forty acres per day.

sided at Chaeronea, where he filled the office of magistrate and was a priest to Apollo. His long life was associated with the historic reign of Nero and with that of Trajan.

The fame of Plutarch rests upon his excellent work, entitled "Parallel Lives of Illustrious Greeks and Romans." This work is the most celebrated of ancient biographies and treats of 44 distinguished men. The biographies are arranged in pairs as follows:

1. Eumenes and Sertorius.
2. Cimon and Lucullus.
3. Lysander and Sulla.
4. Demosthenes and Cicero.
5. Agis and Cleomenes.
6. Pelopidas and Marcellus.
7. Phocion and Cato the Younger.
8. Aristides and Cato the Elder.
9. Pericles and Fabius Maximus.
10. Nicias and Crassus.
11. Dion and Brutus.
12. Timoleon and Æmilius Paulus.
13. Philopoemen and Titus Flaminius.
14. Themistocles and Camillus.
15. Alexander and Caesar.
16. Agesilaus and Pompey.
17. Pyrrhus and Marius.
18. Solon and Valerius Publicola.
19. Demetrius and Antonius.
20. Alcibiades and Coriolanus.
21. Theseus and Romulus.
22. Lycurgus and Numa.

It will be noticed that the first mentioned in each of the pairs is a Grecian. Besides these biographies, Plutarch wrote the lives of Artaxerxes Mnemon, Galba, Aratus, Otho, Tiberius, and Caius Gracchus. It is certain that he was the most distinguished writer of biographies of ancient times and few modern writers have equaled him. He is best known from the character of his writings, which show him to have regarded of most worth those virtues that cause men to become celebrated as soldiers and statesmen, or lead them to the ranks of worthy citizens, holding these in higher esteem than artists and poets. It is said that Napoleon was profoundly interested in reading Plutarch, and it is no doubt true that his life was influenced to a considerable extent by the biographies of that writer.

PLUTO (plū'tō), in Greek legend, the surname of Hades, the third son of Cronos and Rhea, and brother of Zeus and Poseidon. The Greeks regarded him ruler of the infernal regions, which were afterward known as Hades, being so named from Pluto. In the time of Homer, Hades was the name of a person instead of a place, as it was afterward applied, and the people of his time had no conception of two distinct realms for the departed, but both the good and bad were thought to live together. In later history Hades became the name of a place, and it was thought to consist of two distinct regions, the realm of the good being known as *Elysium* and that of the wicked as *Tartarus*. This modification of the conception of the realm of the departed also modified the station assigned Pluto, who became the ruler of Tartarus, but he was regarded as the guardian of treasures below the earth, and it was thought that he caused an abundance of fruit to spring from

the soil. The name Pluto is from *plutein*, meaning to be rich. In later times the Romans adopted the Grecian notions with regard to a future state, and began to worship Pluto in place of Dis Pater, a name derived by them from *dives*, meaning rich.

PLUTUS (plū'tūs), the Grecian god of riches, son of Demeter and a mortal called Jason. It was the common supposition that Plutus bestowed his gifts upon the good. He was made blind by Zeus that all should receive the benefits of his riches without discrimination. He is represented in statuary as coming slowly to men, but when he departs he is born away swiftly by wings. His dwelling place was under the surface of the earth. Aristophanes made Plutus the subject of a comedy.

PLYMOUTH (plīm'ūth), a port of entry in Massachusetts, county seat of Plymouth County, 37 miles southeast of Boston. It is on Plymouth Bay, an inlet from Massachusetts Bay, and on the New York, New Haven and Hartford Railroad. The site is the famous landing place of the Pilgrim Fathers, who came here on Dec. 21, 1620. Among the noted buildings is Pilgrim Hall, a memorial hall erected in 1824 by the Pilgrim Society in memory of the Pilgrims. It was remodeled in 1880. This structure contains a fine collection of paintings relative to the history of the Pilgrims, the most noted being "Landing of the Pilgrims," "Embarkation of the Pilgrims," and "Embarkation from Plymouth, England." It has a number of portraits and a large collection of articles and curiosities brought over in the *Mayflower*. Other buildings include the public library, the high school, a number of fine churches, and the municipal buildings. Another structure of prominence is the National Monument to the Forefathers, erected in 1859, but not completed and dedicated until 1889. It is built of granite, is 81 feet high, and is one of the finest works of art in America. The city has manufactures of cotton and woolen goods, furniture, hardware, cordage, machinery, and metalware. It has a large harbor and a growing coastwise trade. Population, 1905, 11,119; in 1920, 13,022.

PLYMOUTH, a borough of Pennsylvania, in Luzerne County, on the Susquehanna River. It is on the Delaware, Lackawanna and Western Railroad and is surrounded by an anthracite coal-mining country. The features include the public library, the high school, the municipal hall, and a number of churches. It has manufactures of silk fabrics, hosiery, clothing, earthenware, and mining machinery. Plymouth was settled in 1768, and was claimed by both Connecticut and Pennsylvania until 1797. Population, 1900, 13,649; in 1920, 16,500.

PLYMOUTH, a seaport of England, in Devonshire, between the estuaries of the Tamar and Plim rivers, on the north shore of Plymouth Sound, 200 miles southwest of London. The city is well defended by land and sea, has

an excellent harbor, and is improved by modern municipal facilities. It has a large number of charitable and educational institutions, many large churches, and fine business blocks. Saint Andrew's Church dates from 1490 and Charles Church, dedicated to Charles the Martyr, was built in 1646. The city has numerous public parks, several boulevards, and a public library. It has railroad and electric railway connections with inland points. The commercial trade extends to all foreign countries, but it is particularly large with the West Indies, South Africa, and Mediterranean ports. At the time of the Norman conquest Plymouth was a fishing village, when it was known as Sutton, but at the time of Edward the Black Prince it rose into prominence, and was an important factor in the history of England for many years. From this place the Pilgrim Fathers sailed for America in the *Mayflower* in 1620. Population, 1921, 112,042.

PLYMOUTH COLONY. See **Pilgrim Fathers.**

PLYMOUTH ROCK, a granite boulder on Massachusetts Bay, celebrated because of the landing of the Pilgrim Fathers on Dec. 21, 1620. It is supposed that Mary Chilton and John Alden were the first Europeans to set foot upon the rock. A large piece was broken from the rock in the early period of the colony, and this was taken by twenty yoke of oxen to the center of the city of Plymouth, where it was surrounded by an iron railing, but it was returned to its original position at Hedges' Wharf in 1880.

PLYMOUTH SOUND, an inlet from the Atlantic Ocean, on the southern coast of Cornwall, England. It receives the waters from the Tamar and Plim rivers, and on its north shore is the city of Plymouth. An important breakwater was constructed in 1812 to protect the harbor. This structure, although secure and massive from the first, was improved at different times. The amount of money expended on this breakwater is about \$8,250,000 and it is one of the most noted in Europe. It consists of a substantial mole of stones and affords ample protection for the anchorage of vessels within the inclosure formed by its extension of about one mile. Plymouth Sound possesses much natural beauty and has been the scene of many historic and decisive naval engagements. The Eddystone lighthouse is situated about fourteen miles southwest of the breakwater.

PNEUMATIC DISPATCH (nū-măt'ik), a system of transmitting written dispatches through narrow tubes by the agency of air pressure. Attention was first called to the utility of rapid transmission for short distances through the agency of air by Denis Papin in 1667, when he presented a paper to the Royal Society in London entitled "Double Pneumatic Pumps." However, the system was not practically applied until about the middle of the 19th

century, but at present it is utilized in many cities of America and Europe. In general the system consists in having two tubes of cast iron between the desired stations, forming a circuit in which the air is kept constantly circulating. A compressor forces air into the tubes at a pressure depending upon the length and size of the system. Mechanical devices make it possible to place the matters to be carried into a receptacle within the tube without a waste of air pressure, and they are carried to the other end and deposited into the receiving tray. The time of transit is usually 1,000 yards per minute, but this varies according to the pressure and size of the tube. The pneumatic dispatch line between the New York post office and the Grand Central Palace office is three and one-fourth miles long and is one of the largest in America. In Berlin, Germany, the lines have many stations, and include about 75 miles of tubes, in which the dispatch speed is about twenty miles per hour. Many different systems are now in successful use, in some of which the carriage is by suction. Larger systems have been installed in many cities to carry freight and passengers.

PNEUMATICS, the branch of science which treats of gases, either at rest or in motion. Gases differ from liquids in that their molecules possess greater freedom of motion, but, like the latter, possess the following properties: They transmit pressure equally in all directions; the downward, upward, and lateral pressures at any point are equal; and bodies weighed in air or gas lose a weight equal to the weight of the air of any gas they displace. The repulsive tendency in gases is very marked, which may be seen by placing a small quantity of gas into an empty vessel, when it will expand until the entire vessel is filled. The science of pneumatics includes an investigation of the property of gases, such as their density, weight, pressure, elasticity, condensation, rarefaction, equilibrium, and diffusion. It investigates the instruments and machines that depend upon the pressure and elasticity of air for their actions, such as the barometer, balloon, and air pump. See **Gas**; **Air Pump**.

PNEUMATIC TIRE, a tube of rubber used in the manufacture of wheels for various vehicles, such as automobiles and bicycles. The pneumatic tires for vehicles of this class are made of several thicknesses of canvas and rubber formed into endless air-tight tubes. The purpose is to lessen jars, reduce noise, and overcome to some extent the effects of a rough surface upon the vehicles. They are held in place principally by the U-shaped form of the rim. To maintain a uniform inside pressure, air is pumped into the tube, which has a valve protected by a screw cock or cover to hold the air in confinement. Improved methods of construction have greatly reduced the liability of puncture, and small holes, as from puncture.

by nails, can be repaired by cements. Many carriages have rubber tires, but these are solid and are closely fitted on the rim of the wheels, the purpose being to reduce noise and lessen jars, especially in driving on pavements and hard surfaces.

PNEUMATIC TOOLS, the name of a class of tools operated by compressed air. They are applied principally by hand and the mechanism which receives the impulse from the compressed air is in the handle. Two types of pneumatic tools are in extensive use, known as *percussion* and as *rotary* tools. The first type includes those used for drilling, riveting, chipping, caulking, ramming, and hammering. They are used in working in metal, cutting stone, and carving wood. An air compressor located at a congenial and central point conducts the compressed air through a suitable connection, which includes a flexible hose of some length so as to permit the workmen to handle the tool with facility. Percussion tools strike from 1,500 to 20,000 blows per minute, depending upon the manner of construction and handling for the particular use to which they are applied. A valve in the handle permits the operator to control both the speed and the force.

Rotary tools are used for drilling and boring in wood and for various purposes in metal work, such as boring cylinders, screwing nuts on bolts, expanding tubes, grinding joints of steam pipes, and boring cylinders and valve seats. The drills are made in a large number of sizes and forms, hence may be adjusted or replaced with facility as the character and progress of the work to be done may require. The mechanism works with an air pressure of from 60 to 80 pounds, but in the larger tools the pressure is 125 pounds to the square inch. Pneumatic tools are used very extensively in the larger industrial establishments, especially in England, Germany, Canada, and the United States.

PNEUMONIA (nū-mō'nī-à), or **Lung Fever**, an inflammation of the substance of the lungs, especially of the air sacs and the framework of that organ. It is common to all ages, but prevails more frequently in spring and autumn than in summer and winter, and cases are more numerous in the cold and temperate than in the tropical climates. Sometimes it is difficult to assign a direct cause, but usually it is due to intemperance, want of ventilation, sudden exposure to severe cold, and hereditary tendencies to pulmonary diseases. Typhus, eruptive, and typhoid fevers often give rise to pneumonia. The direct cause of the disease is a minute bacteria. Medical science places it in the list of infectious as well as slightly contagious diseases. The early symptoms are chills, high fever, and a severe pain due to the accompanying pleurisy. Later a cough arises, expectorations of viscid sputum become frequent, and the pulse and respirations become rapid.

Sleeplessness and delirium are common. The crisis usually occurs in from five to ten days. Death is usually due to heart failure caused by the poisonous influences of the bacteria. *Broncho-pneumonia* is the name applied to the disease when it affects both the finer bronchial tubes and the lungs.

PO, a river of Europe, the largest in Italy. It rises in the Alps, near the boundary line of France, at an altitude of 6,000 feet, and drains the large plain of northern Italy lying between the Alps and the Appenines. The entire length is 417 miles and its basin is 27,750 square miles. It enters the Adriatic Sea by a large delta, extending inland above Ferrara, a distance of 60 miles, and its width at the sea is about 58 miles. The Po is remarkable for its width and the large volume of water carried from the mountains to the sea. Its extensive navigation facilities make it an important route. Among the tributaries are the Adda, the Ticino, the Mincino, and the Trebbia. Turin is the most important city on its banks, but there are others that enjoy a large commercial trade.

POBIEDONOSTZEFF (pà-byě-dà-nôs'-tsěf), **Constantine Petrovitch**, priest and author, born in Moscow, Russia, in 1827; died March 23, 1907. He studied at the University of Moscow and in Saint Petersburg, where he graduated in 1846, and soon after entered the civil service at Moscow. In the meantime he lectured on civil law at the university, where he was professor from 1860 until 1865. He



M. POBIEDONOSTZEFF.

was appointed a senator in 1868, became a member of the council of the empire in 1872, and was chosen Procurator of the Holy Synod in 1880. He held the last mentioned position until 1905, when he resigned this high office and retired from public affairs. As a matter of policy he opposed the growth of democracy in Russia. He published a number of works on government, including "A Course in Civil Law" and "The Reflections of a Russian Statesman."

POCAHONTAS (pō-kà-hōn'tàs), daughter of Powhatan, a distinguished Indian chief, born in 1595; died off Gravesend, England, in March, 1617. Her early life was spent among the Indians in Virginia. In 1607 she became connected with the early history of America by saving the life of Capt. John Smith and otherwise showing friendship for the English colonists. Smith had been taken prisoner while making an exploring expedition and was about to be executed, when she prevailed upon her father to spare his life, and two years later she informed the colonists of an intended Indian raid.

In 1612 she was held as a hostage by an English force and the following year became converted to Christianity, being christened Rebecca. She married John Rolfe, an Englishman, in 1614, and two years later accompanied him to England. King James received her at his court as Lady Rebecca. She was an object of much interest during her stay of six months and died on the ship returning to Virginia, off Gravesend. She was the mother of a son, who received an education in London, and from him a number of illustrious families of Virginia descended.

POCATELLO (pō-kā-tě'lō), a city of Idaho, county seat of Bannock County, in the southeastern part of the State. It is on the Port Neuf River and the Oregon Short Line Railroad. The surrounding country has been made very productive by irrigation, yielding grain, fruit, and vegetables. It has a growing trade in live stock and merchandise. The noteworthy buildings include the county courthouse, the high school, the municipal buildings, and the Academy of Idaho. Among the manufactures are earthenware, clothing, cigars, and machinery. The place owes its early growth largely to the development of mining interests in the vicinity. Population, 1920, 14,961.

POE, Edgar Allan, noted poet, born in Boston, Mass., Feb. 19, 1809; died Oct. 7, 1849. He lost his parents when only two years of age



EDGAR A. POE.

and was adopted by John Allan, a wealthy merchant of Richmond, Va. His father was a man of good family and his mother was a professional actress. He attended school in England from 1816 until 1821, and at the age of seventeen entered the University of Virginia, at Char-

lottesville, where he showed distinguished ability as a student, but left the university at the end of one session principally because he had a great passion for card playing and contracted many debts. This conduct caused a quarrel with Mr. Allan, and Poe joined the U. S. army as a private under the name of Edgar A. Perry. He returned to Richmond in 1829, and, after remaining at home a year, entered the West Point Military Academy as a cadet. His ambitions at that time were wholly for literature, thus causing him to neglect his duties and disobey orders until he was finally dismissed from the United States service.

From West Point he again returned to his home, but in the meantime Mr. Allan had become a widower and married a second time. At the death of Mr. Allan, in 1834, the estate

was left to his young son, while Poe was not mentioned in the will. Poe was now thrown upon his own resources for a livelihood and became engaged wholly in literary work, contributing to various newspapers and magazines in Richmond, New York, and Philadelphia. His first regular contributions were made to the *Southern Literary Messenger*, in Richmond, which he edited for some time, but in 1837 he removed to New York and had charge of editorial work on the *Quarterly Review*. The following year he edited *Graham's Magazine* in Philadelphia, and remained its principal writer for four years. The entire literary career of Poe embraces fifteen years, most of which time he was connected with periodicals in some manner, but at intervals wrote many criticisms and some choice poetry. His first remarkable success was achieved in 1833, when he secured a cash prize of \$100 by contributing the tale, "A Manuscript Found in a Bottle," under a competitive test to a Baltimore magazine. The best known poem from his pen is "The Raven," which he published in 1845.

Writers have differed widely as to the worth of Poe from a moral standpoint, but all have credited him with an unrivaled power in making friends and with marked ability as a writer of intricate sentences and beautiful verses. Perhaps it is true that his tendency to indulge in gambling and strong drink largely affected his power as a writer. It rendered him sensitive and melancholy, and caused him to waste to a great extent his genius and throw away his life. However, the force with which he appeals to universal sentiments has never been surpassed, and his knowledge of the mechanism of composition is truly wonderful. Though his writings are limited, they will endure as representative compositions of the last century. He married Virginia Clemm, his cousin, in 1832, but she died childless in 1847, and Poe died soon after in Baltimore from the effect of excessive drinking. The best known of his writings include "The Raven and Other Poems," "The Gold Bug," "The Purloined Letter," "The Mystery of Marie Roget," "The Fall of the House of Usher," "The Narrative of Arthur Gordon Pym," "The Haunted Palace," "To Helen," "The Descent into the Maelstrom," "The Murders of the Rue Morgue," "Annabel Lee," and "The Bells." He published a compendium, entitled "The Philosophy of Composition." Among the biographies are Whitman's "Edgar Allan Poe and His Critics" and Woodberry's "Life of Edgar Allan Poe."

POE, Orlando Metcalfe, engineer, born in Navarre, Ohio, March 7, 1832; died Oct. 2, 1895. He graduated at the West Point Military Academy in 1856, and until 1861 was engaged with an engineering corps in surveying in the vicinity of the Great Lakes. In the early part of the Civil War he served on the staff of General McClellan, was appointed brigadier general in

1862, and afterward served as chief engineer of the army under Sherman that invaded Georgia and later marched to the sea. Subsequent to the war he served on the United States Lighthouse Board, and in 1870-73 built the lighthouse in Lake Huron which is situated on Spectacle Reef. He was again a member of the Lighthouse Board in 1874-84, and served on other boards having charge of harbor and river improvements in the vicinity of the Great Lakes. Poe held the rank of colonel of engineers and was major general in the regular army.

POERIO (pō-ā'rē-ō), **Carlo**, statesman and patriot, born in Naples, Italy, Dec. 10, 1803; died at Florence, April 28, 1867. He descended from a family distinguished for its devotion to liberty. When his father was exiled after the Revolution of 1820, Carlo accompanied him to Styria. His education was carefully directed by his father, and, after studying law at Naples, he became an advocate of recognized ability. In 1828 he was identified with the liberals in Naples, was imprisoned for supporting a conspiracy in 1838, and again for aggressive movements for independence in 1847. He was chosen a leader of the Revolution of 1848, and after the adoption of a constitution held a number of important offices and was selected as deputy to the parliament. The government accused him of being a member of the Italian Unity, which had for its purpose the support of Garibaldi and the proclamation of a republic, and in 1849 he was condemned to imprisonment for twenty years at hard labor. The treatment accorded him and a number of others attracted the attention of many prominent statesmen of Europe, among them Gladstone, who wrote the famous "Two Letters to Lord Aberdeen" in 1851. Fearing a popular rising, Emperor Ferdinand II. concluded to liberate the prisoners by transporting them to South America. They sailed from Italy in the early part of 1869, and at Cadiz, Spain, they were placed on board an American vessel, but when they reached Cork, Ireland, the captain was induced to permit them to land. Poerio proceeded first to London, but later returned to Turin, where he was received with enthusiasm, and later was elected to parliament as deputy from two colleges in Tuscany. He became vice president of the Italian chamber of deputies in 1861, and took a leading part in national affairs.

POETRY (pō'ēt-rŷ), one of the fine arts, and the form of literature that has for its object the creation of intellectual pleasure by the use of imaginative and passionate language. It is generally written in regular measure. However, it is not essential that its form be reduced to meter or rhyme, and in this widest sense poetry may be defined as that which is the product of the imaginative powers and fancy, and which appeals to the imagination and the sensibilities of others. Poetry is the earliest form of literature, and may be regarded

the final and ideal of all pure literature. In this sense it ranks between prose and music, and the skillful poet intermingles the three lines of art by bringing prose into the realm of poetry and touching his rhythm with musical rapture.

The three forms of poetry generally recognized are epic, lyric, and dramatic. *Epic poetry* embraces the narrative form; *lyric poetry* includes all varieties of serious and comic song, the anthem, hymn, ode, elegy, and sonnet; and *dramatic poetry* embraces the poetry of action scenically represented, including both tragedy and comedy. Some writers also include *didactic poetry*, the poetry of thought, or intellect, and *satirical poetry*, the form employing sarcasm, irony, ridicule, or humorous exaggeration. The several classes of poetry are not distinguished by distinct lines of demarkation. In fact, each class may contain elements of the different forms, which is specially true of epic poetry, since it partakes largely of the character of both lyric and dramatic imagination. Hindu poetry has its earliest types in the Rig-Veda, which consists in large part of rhythmic hymns, but the highest forms of Hindu poetry are found in the epics known as the *Rāmāyana* and the *Māhabhārata*.

Portions of Genesis and Exodus comprise the earliest poetry of the Hebrews, and their highest forms are found in the Book of Job and the Psalms. Grecian poetry began with Homer and Hesiod and flourished until about 500 B. C. The greatest Roman poets are Virgil and Horace. Geoffrey Chaucer may be regarded the founder of English poetry, but Shakespeare is the most renowned English poet. Other poets of England include Spenser, Milton, Dryden, Pope, Cowper, and Byron, while Burns is the greatest of Scottish poets. The most distinguished poets of Germany include Goethe, Schiller, Heine, Uhland, Wieland, and Opitz. Among the American poets are Longfellow, Bryant, Lowell, Whittier, and Poe.

POINCARÉ, Raymond, statesman, born at Bar-le-Duc, Lorraine, France, in 1850. He studied in Paris, became a successful lawyer, and entered politics. In 1893 he became minister of public instruction and later was minister of finance. He rendered valuable service in Parliament, where he acquired fame as an advocate of sound government, and in 1912 was chosen minister of foreign affairs. In 1913 he was elected President, succeeding President Fallières.

POINCARÉ (pwān-kā-rā'), **Jules Henry**, mathematician and physicist, born in Nancy, France, in 1854. He studied in his native city and in Paris, giving particular attention to the sciences and engineering. In 1886 he was made professor of mathematical physics and calculus of probabilities in the University of Paris. He contributed essays on physics and mathematics to a number of leading periodicals and published several standard works, including

"Electricité et optique," "Calcul des probabilités," "Théorie analytique de la propagation de la chaleur," and "Théorie du potentiel Newtonien." He died July 18, 1912.

POINTER, a class of sporting dogs allied to the true hounds, remarkable for their habit of pointing with the head toward the game.



POINTER.

The habit is instinctive, since it may be noticed in puppies, but it can be improved materially by training. The pointer originated in Spain, to which country its progenitor was brought from the East. It has since been crossed with the fox hound and greatly resembles that class of dogs. A well-trained pointer stops immediately on scenting game and remains perfectly at rest, indicating the direction of the game.

POISON (poi'z'n), any substance that tends to cause death or seriously injure health when taken into the system by cutaneous absorption, swallowing, or inspiration. Poisons produced by animals are generally called *venoms*, and those resulting from diseased tissues are known as *virus*. The poisons sold in the trade are classed as animal, vegetable, and mineral, according to the sources from which they are derived. The general classification in medicine is governed by their effect upon the living tissues, including the four classes known as narcotic, narcotico-acrid, irritant, and petrescent, or septic. *Narcotic poisons* have a special effect upon the spinal cord and brain, causing headache, obscurity of sight, giddiness, stupor, convulsions, and finally death. They produce no irritation, are not burning or acrid to the taste, and their effect upon the tissues is not marked, leaving no traces after death except a slight enlargement of the nerve fibers and brain. Among the principal narcotics are chloroform, opium, alcohol, belladonna, ether, chloral, hemlock, henbane, and India hemp.

The *narcotico-acrid poisons* produce symptoms similar to those caused by narcotics, and vomiting, nausea, and convulsions. They consist of such substances as aconite, nux vomica, hemlock, poisonous mushrooms, and nicotine—the

poisonous principle of tobacco. *Irritant poisons* include acids, some alkalis, mercury, arsenic, vegetable acids, animal irritants, the vapor of nitrous acid, strychnine, and many others. The *petrescent* or *septic poisons* consist of animal poisons, such as the bites of venomous snakes and rabid animals, the stings of insects, and the poisons generated by pestilential carbuncle. Many of the poisons are of value in medicine and have a stimulating effect when taken in small quantities, but excessive use causes an impairment of the vital functions, while an unusual or large quantity produces death.

The poisonous principles contained in alcohol, opium, and tobacco are employed by a large number of people for stimulative purposes, but it has been shown successfully that none of them is a food and they do not enter into the support of life or living tissues. Laws to restrict or prohibit the improper use of these poisons have been made in many countries and their sale is either restricted or totally prohibited. To impress the evils of these habits upon the minds of children, the subject-matter of physiology taught in the public schools includes a systematic presentation of the evils of stimulants and narcotics upon the human system. It is hoped that sobriety and temperate habits, founded upon intelligence, will be obtained as a result.

POISON IVY. See **Sumac.**

POISONOUS PLANTS, the term which embraces the plants that have poisonous properties, either when taken into the stomach or brought in contact with the surface of the skin. The line of demarkation between poisonous and nonpoisonous plants is not distinct, since many species are harmless to some persons and injurious to others. Many plants are more or less poisonous in a natural condition, but are rendered harmless or even wholesome food when cooked. To this class belongs the potato, which has slight traces of poison that in a concentrated form become harmful.

A number of plants possess poisonous substances in sufficient quantities to render them harmful both to man and animals, while some are injurious only under some conditions. The poison ivy, a climbing or trailing shrub of North America, is quite poisonous. It ascends trees and rocks, attaching itself to them by many small rootlets, and causes an itching sensation to some persons when coming in contact with the skin. The *strychnos nux vomica* trees or shrubs, from which strychnine is obtained, are exceedingly poisonous. Some mushrooms have harmful properties, hence care should be exercised in selecting species for the table. Henbane, belladonna, black nightshade, and water hemlock are among the poisonous flowering plants. The foliage of the wild cherry is harmful and poison sumac is injurious to the skin when touched. Polkweed, aconite, lobelia, hellebore, bittersweet, and digitalis have poisonous

properties. Many products useful in the arts and in medicine are obtained from plants belonging to this class.

POITIERS (pwä'tyâ), or **Poitiers**, a city of France, capital of the department of Vienna, on the Boivre and Clain rivers. It is situated in a fertile region, has railroad facilities, and has been improved by many public utilities. Walls surround the city and it is otherwise fortified. A number of bridges cross the rivers at convenient points. The city has several parks, a public library of 25,000 volumes, and a number of fine educational institutions and churches. The cathedral is the most noted public building. In the vicinity are remains of Roman temples, baths, an aqueduct, and an amphitheater. Among the manufactures are textiles, earthenware, toys, machinery, and utensils. It has a large trade in produce and merchandise. Poitiers is one of the oldest cities of France and dates from prehistoric times. In 507 A. D. it was the scene of a decisive battle between Clovis and the Visigoths under Alaric, in which the latter were defeated. Near it Charles Martel won a victory over the Saracens under Abd-ur-Rahman in 732. In 1356 an English army under Edward, the Black Prince, defeated the French under King John II. about five miles north of the city. Population, 1916, 39,302.

POKEWEED (pōk'wēd), a stout perennial plant native to the United States and Canada, where it is seen as a common weed by the roadside. It has large leaves and greenish-white flowers, and yields berries filled with a crimson juice. Its roots are very large and branchy and contain emetic and cathartic principles. The berries yield medical properties useful in rheumatism. In some localities the young shoots are used as a substitute for asparagus, and in Portugal the crimson juice of the berries serves in coloring port wine.

POLAND (pō'land), formerly a powerful kingdom of Europe. The region is called *Polska* by the Poles, meaning a plain. It included a large section south of the Baltic Sea and at the time of its greatest prosperity had an area of 282,000 square miles. At this time the population was probably 24,000,000. The length from north to south was about 710 miles and the breadth was 675 miles, embracing a large part of the fertile central plain of Europe. The only mountains of this region are the Carpathians on the southwestern boundary, and from them a range of hills extends toward the northeast and forms the principal watershed between the rivers flowing into the Black and Baltic seas. A large part of the surface is a fertile and undulating plain. The drainage toward the Black Sea is by the Dnieper, Dniester, South Bug, and Pripet rivers, while the Dwina, Vistula, and Nieman belong to the Baltic system. It has splendid forests of oak, birch, pine, and other valuable species of timber.

Agriculture, dairying, and stock raising are the principal industries, all of which are conducted on a large scale, but it likewise has extensive commercial and manufacturing interests. Transportation is by canals, rivers, and railroads. Railway and electric lines are adequate to the demands of the country.

Poland was originally populated by the Polani, a Slavonic race, who occupied the region between the Oder and the Vistula in the early history of Europe. Small principalities existed for many centuries, but in 962 Mieczyslaw I. united the different communities and governed successfully until 992. He is classed as a representative of the Piast dynasty, but was himself a vassal of the Emperor of Germany. In his reign Christianity became the religion of the Poles. He united the Polish people in a union that endured until the latter part of the 18th century. In 992 Boleslaw the Great succeeded to the throne and reigned until 1025. He not only consolidated the kingdom, but extended it beyond the Dniester, the Oder, and the Carpathians, and later annexed territory by defeating the army of Emperor Henry II. of Germany and a number of the Russian princes. The German emperors were required to recognize him as king and henceforth Poland was one of the independent powers of Europe, which position it held for more than 700 years.

Among the causes that led to the decline of Polish power are the weakness of its rulers, the protracted internal disagreements, the extensive and intolerant influence exercised by the Jesuits, the want of natural boundaries, and the control of trade and manufacture by Germans and Jews. Local dissensions became so widespread under Stanislaus Augustus, who ruled from 1764 to 1795, that Prussia, Russia, and Austria interfered with the government in 1772 and made the *first partition* of Poland. In this partition Russia received 42,000 square miles of Polish territory; Austria, 27,000; and Prussia, 13,000. Local dissensions not only continued, but disputes arose between the regions annexed and the different countries, and in 1793 Russia and Prussia advanced their armies against the fruitless resistance under Kosciuszko. In the *second partition* that followed Russia took 96,000 square miles and Prussia received 22,000.

Hostilities broke out anew the following year, in 1794, and Kosciuszko commanded the Polish army with remarkable bravery, but he was overcome by superior numbers and in 1795 the *third and last partition* took place. In this final division Russia received 43,000 square miles; Prussia, 21,000; and Austria, 18,000. In 1815 the division of Poland was rearranged by the Congress of Vienna and Russian Poland was organized as a constitutional monarchy. It existed in this form until 1830, when the French revolution induced the Poles to attempt to throw

off Russian power. They were not only defeated, but practically all power was taken from the King of Poland, and the Russian language became the adopted tongue of all the courts and educational institutions. This part of Poland at present has a population of 10,500,000, about two-thirds being Roman Catholics. The portions of Poland included in Germany and Austria were united with Poland in a republic in 1919. Area, 85,309 sq. mi.; population, 22,373,106.

The Polish language belongs to the western branch of the Slavonic tongue and is closely allied to the Lusatian, Wendis, and Czech or Bohemian. It is still spoken by about 10,000,000 people, half of whom are in Russia and the remainder are in Austria, Prussia, and Turkey. The language is rich in synonyms, has a precise orthography, and has a practical grammatical structure. Compound words are rare, except as they have been introduced from other languages. Polish literature is not as rich in popular legends as that of other Slavonic tongues, and does not date from as early a period as the Czech. Early Polish writers employed the Latin language in their religious, political, and historical productions, largely because the Latin was cultivated under the direction of the church, but after the revival of learning in Europe numerous lexicons appeared in the Polish. The national song, entitled "Piesn Boga Rodzica," was written in 1408 and in 1455 Queen Sophia translated a large part of the Bible. In the 16th century Peter Kochanowski translated Tasso's "Jerusalem Delivered." The period between 1521 and 1621 was the most prolific in Polish literature, and Nicolas Rej is noted as the most eminent poet of that time. Subsequently many eminent writers contributed to the fund of literature, including Mickiewicz, Slowacki, Zaleski, and Kraszewski. Polish literature includes representative productions in all branches and is particularly rich in historical, political, and poetical writings. The German allies drove the Russians entirely out of Poland in 1915, but were expelled in 1918.

POLAR BEAR (pō'lēr). See **Bear**.

POLAR CIRCLE. See **Arctic**.

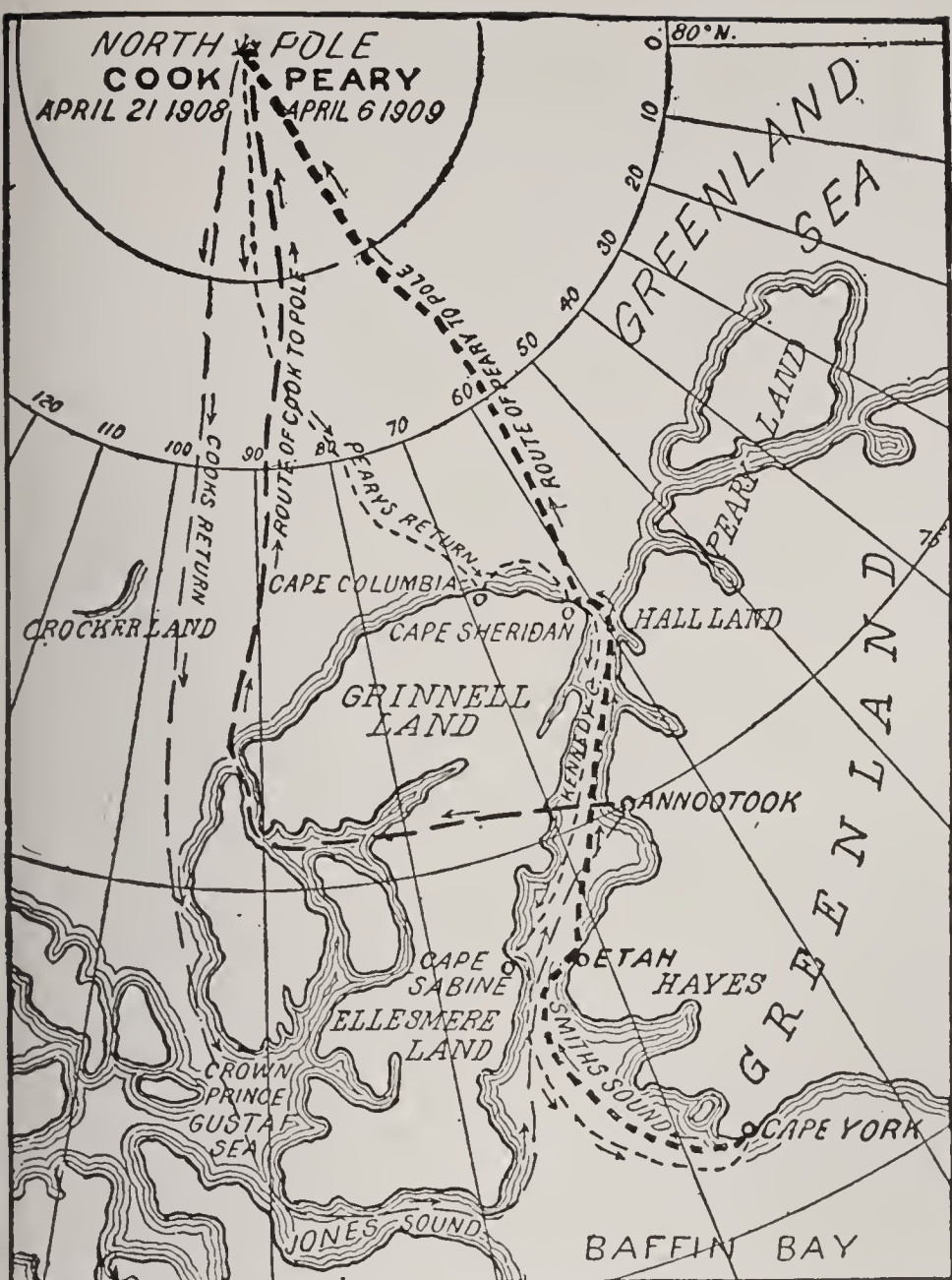
POLAR EXPEDITIONS, the exploring expeditions made by navigators to the north and south polar regions. The objects of these expeditions have been mainly those of finding new routes of travel and exploring high latitudes in search of an open sea. Navigation in these regions is rendered extremely difficult by intense cold and vast accumulations of ice. For these reasons many millions of square miles are still unexplored and unknown.

NORTH POLAR EXPLORATION. The Norsemen were the first navigators to penetrate beyond the Arctic Circle. Besides exploring the northern part of the Scandinavian peninsula, they colonized Iceland, and in 1001 cruised along the northeastern coast of North America. Subsequently their navigators penetrated far north

along the shores of Greenland, but the black death that visited Norway in 1347 caused Iceland to be neglected and their explorations were abandoned.

In the latter part of the 15th century an opinion prevailed in England that India could be reached by sailing northwest. Accordingly Henry VII. commissioned Sebastian Cabot in 1517 to search for a northwest passage by sailing around the northern coast of America. In his explorations Labrador and Newfoundland were discovered, and soon after successive expeditions were made in the same region by Frobisher, Hudson, Davis, and Baffin, each discovering new fields, and their memory is perpetuated by some particular bodies or channels of water bearing their names. Fox and James made an expedition in 1631 to the northeastern region of North America. Soon after returning to Europe the belief became general that if a northwest passage from Davis Strait to Bering Strait could be found it would be practically unavailable for commercial purposes because of the intense cold prevailing in that region the greater part of the year. The enterprise soon fell into disrepute and remained neglected for more than a century, but King George III. revived it in the latter part of the 18th century. An expedition under Captain Phipps, later Lord Mulgrave, sailed to Spitzbergen in 1773, and after many hardships succeeded in reaching 80° N. Lat. Soon after Captain Cook made an unsuccessful attempt to penetrate beyond that point, and the enterprise was again abandoned until the beginning of the 19th century.

Captain Scoresby explored the eastern coast of Greenland in 1806 and reported a remarkably open sea. Soon after a reward of \$100,000 was offered by the British government to the discoverer of the northwest passage. This caused numerous efforts to be made, the most famous being that of Sir John Franklin, who embarked from England May 19, 1845. He sailed for Bering Strait from Lancaster Sound, and, after enduring much difficulty with ice floes, his ships were frozen in at a point near 70° N. Lat., where Franklin died in 1847. As no tidings from his expedition reached England, serious apprehensions began to spread, and many expeditions were sent to relieve those thought to be still alive. The first relief expedition started in 1847 under Richardson and Rae, and many others followed, but no tidings of the fate of Franklin's expedition were secured until in 1853, when Rae learned of its fate while exploring King William's Sound. Two years later portions of the *Erebus* and the *Terror*, the two vessels with which Franklin sailed, were discovered by Anderson. One of the relief expeditions was under the direction of McClure, who sailed from Plymouth to Bering Strait in 1850. Thence he proceeded east and finally reached the Atlantic, and re-

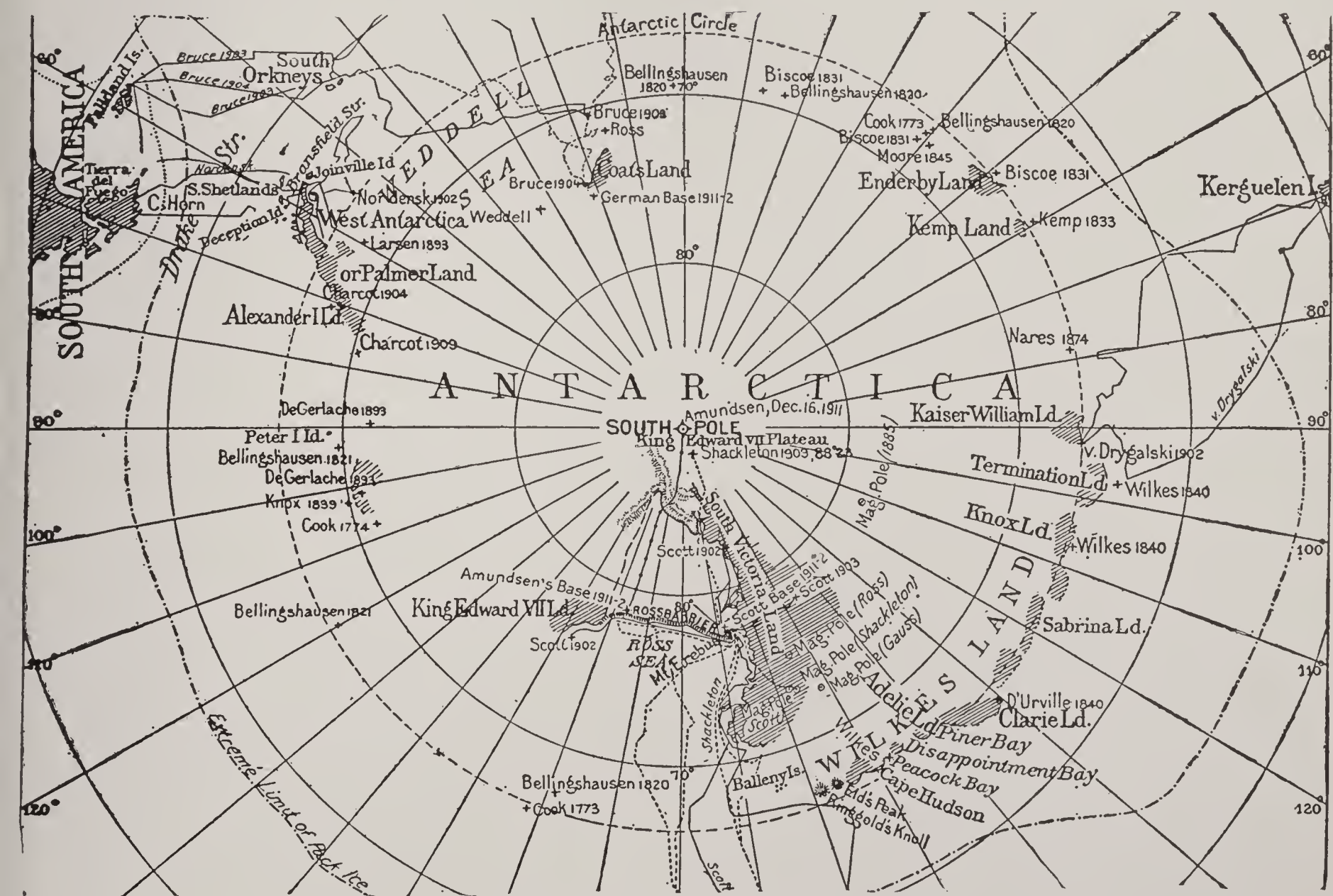


DISCOVERY OF THE NORTH POLE AND THE SOUTH POLE

Frederick D. Cook, an American of German parentage, sailed from North Sydney, N. S., in the *J. R. Bradley* in July, 1907, on an expedition of discovery in the Arctic Ocean. He reached the North Pole by sledges on April 21, 1908, accompanied by two Eskimos, remaining there two days. An unfavorable sea of ice, which had many leads and dangerous crevices during the long day, prevented his return to civilization until in September, 1909. The winter of 1908-1909 was spent on Heiberg Island, where musk oxen and other food were abundant.

Robert E. Peary sailed in September, 1908, with the view of reaching the North Pole. He made the principal part of the trip in the small steamer *Roosevelt*, with which he reached the northern extremity of Grinnell Land. From this region the trip was made by sledges drawn by Eskimo dogs. He reached the North Pole on April 6, 1909, accompanied by a Negro and two Eskimos.

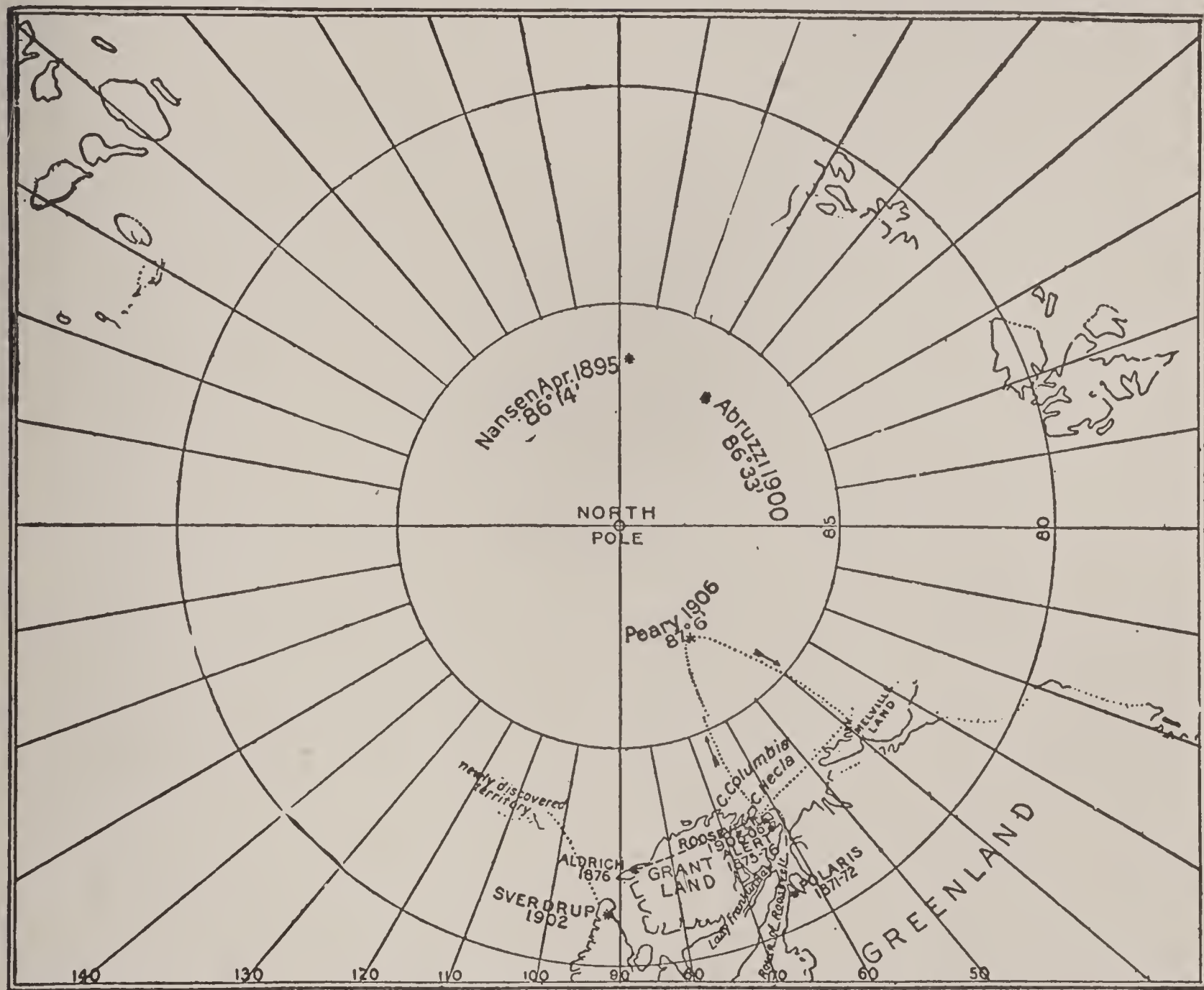
Roald Amundsen discovered the South Pole on Dec. 14, 1911, when he planted the flag of Norway at that point and claimed the region for King Haakon. While explorers agree there is no land near the North Pole, the soundings by Peary showing a water depth of fully 9,000 feet within five miles from the Pole, it is conceded that extensive land masses surround the South Pole. The extent of land of Antarctica, as the region is called, is estimated to be 5,000,000 square miles.



turned to England in 1854, thus being the discoverer of the *northwest passage*. Parliament granted him and his crew an award of \$50,000, and he was knighted. A well-established route exists at present between Davis Strait and Bering Strait, but it is of no practical value aside from supplying geographical knowledge.

European navigators were also active in attempting the discovery of a northeast passage to the Pacific Ocean at a comparatively early date. An expedition under Willoughby rounded Cape North in 1553, and three years later Burroughs explored the southern coast of Nova

Captain Coldewey was sent to the polar regions by the Germans in 1868, and again the following year, reaching the highest latitude attained up to that time on the northern coast of Greenland. Austria sent Payer and Weyprecht, in 1872, to penetrate the regions north of Nova Zembla, when they discovered Franz Josef Land. An expedition sent by the New York *Herald* in 1879 was under charge of Commander De Long, who, with the *Jeannette*, sailed northward from Bering Strait, but the vessel was wrecked in the ice in 1882. The expedition sent from the United States under Lieutenant Greely in



MAP OF NORTH POLAR REGION,
Showing latitudes reached by Nansen, Peary, and Duke of Abruzzi prior to 1907.

Zembla. Captain Cook entered Bering Sea in 1778 with the view of finding the northeast passage by sailing westward from Bering Strait, and soon after Russian explorers made extensive expeditions, both on land and sea. The honor of discovering the *northeast passage* belongs to the Swedish explorer, Professor Nordenskjöld, who sailed from Stockholm in 1878 and made a tour along the northern coast of Eurasia, reaching Bering Strait in the early part of 1879. The north polar expeditions of recent times have been largely with a view of adding to science and reaching the pole regions.

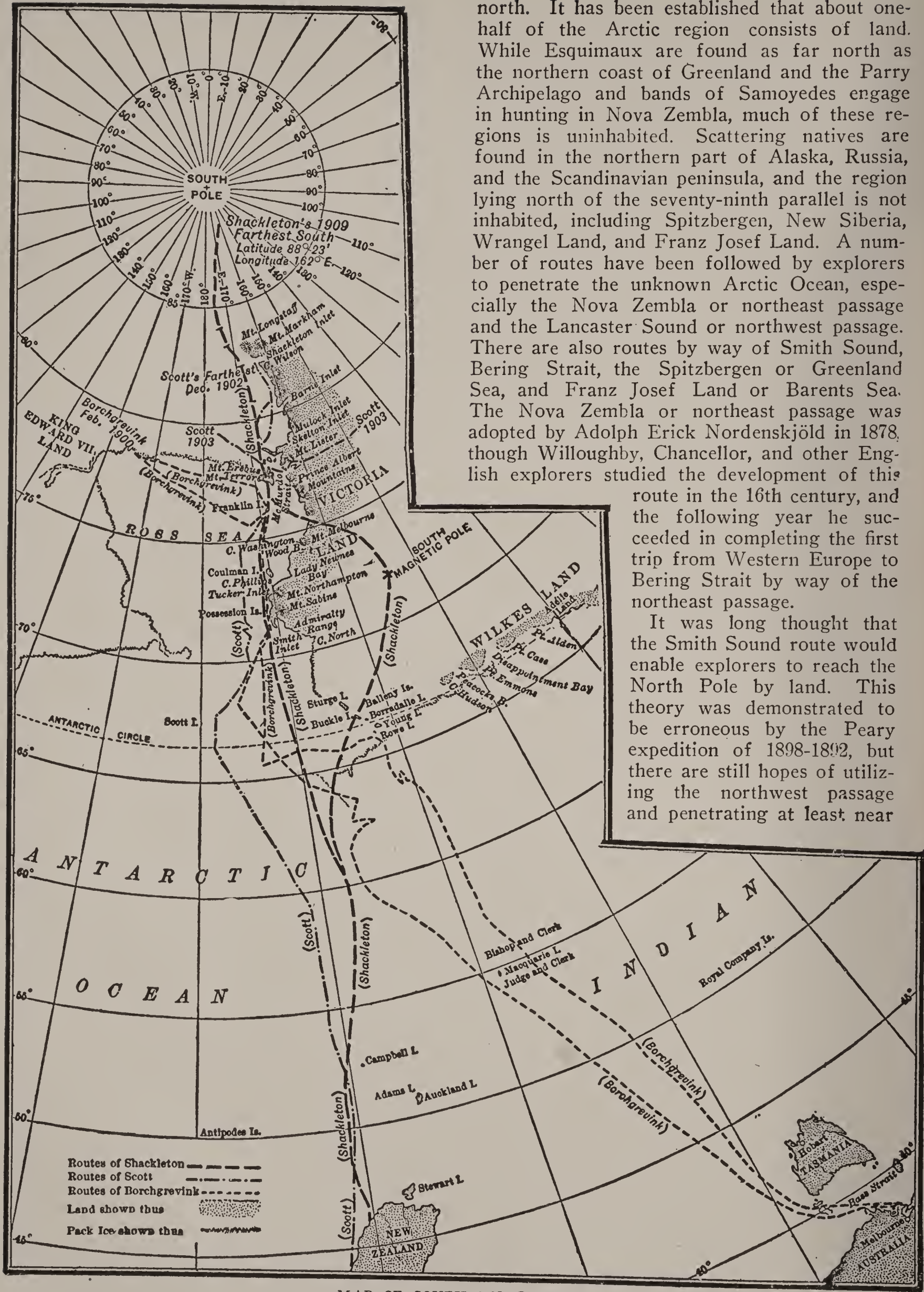
1881-84 reached the farthest point north then witnessed by explorers, $83^{\circ} 24' N.$ Lat., but the terrible hardships caused the loss of 19 of his party of 26 men. The most famous expedition of recent times is the one conducted by Nansen in the *Fram*. He sailed from Christiania, Norway, in 1893 and returned in 1896. The highest point reached by him is $86^{\circ} 14'$, the farthest north on record up to that time. He was the first to cross Greenland from sea to sea.

Recent north polar explorations have enabled navigators to furnish more authentic information relative to the natural aspect of regions far

north. It has been established that about one-half of the Arctic region consists of land. While Esquimaux are found as far north as the northern coast of Greenland and the Parry Archipelago and bands of Samoyedes engage in hunting in Nova Zembla, much of these regions is uninhabited. Scattering natives are found in the northern part of Alaska, Russia, and the Scandinavian peninsula, and the region lying north of the seventy-ninth parallel is not inhabited, including Spitzbergen, New Siberia, Wrangel Land, and Franz Josef Land. A number of routes have been followed by explorers to penetrate the unknown Arctic Ocean, especially the Nova Zembla or northeast passage and the Lancaster Sound or northwest passage. There are also routes by way of Smith Sound, Bering Strait, the Spitzbergen or Greenland Sea, and Franz Josef Land or Barents Sea. The Nova Zembla or northeast passage was adopted by Adolph Erick Nordenskjöld in 1878, though Willoughby, Chancellor, and other English explorers studied the development of this

route in the 16th century, and the following year he succeeded in completing the first trip from Western Europe to Bering Strait by way of the northeast passage.

It was long thought that the Smith Sound route would enable explorers to reach the North Pole by land. This theory was demonstrated to be erroneous by the Peary expedition of 1898-1899, but there are still hopes of utilizing the northwest passage and penetrating at least near



MAP OF SOUTH POLAR REGION,
Showing route of Lieutenant Shackleton and others.

the geographical north pole by land. In 1900 Peary explored Grinnell Land, west of Hayes Bay, and traveled by land to $83^{\circ} 39' N.$, which is the most northern land known at this time. The Franz Josef Land route was taken by the Abruzzi expedition in 1900, which reached $86^{\circ} 33'$, the journey being made by sledges. Peary penetrated northward with sledges from Grant Land in 1906, when he reached $87^{\circ} 6' N.$, Baldwin made an effort in 1904 to reach the North Pole by a balloon, and Wellman made several such attempts in 1908 and 1909, and the project can probably be utilized as advancement is made in aerial navigation. The distinction of discovering the North Pole belongs to Cook (q. v.) and Peary. The former discovered it on April 21, 1908, and the latter reached it on April 6, 1909. Both made the final dash across the ice by using sledges drawn by Eskimo dogs.

SOUTH POLAR EXPLORATION. Dutch navigators were the first to penetrate far into the south seas. The highest latitude reached by them is 63° , where their navigator, Dirk Cherrits, discovered the South Shetland Islands, located near Graham Land. In 1774 Captain Cook reached $71^{\circ} 10' S.$ Lat., and in 1819 the Russian navigator, Bellingshausen, discovered Alexander Land and Peter Land in 70° . Captain Weddell made an expedition to the south seas in 1823 and reached $74^{\circ} 15'$. James Clark Ross, who discovered South Victoria Land, reached $77^{\circ} 32' S.$ in 1841. He explored a portion of this region and found mountain peaks ranging from 9,000 to 13,000 feet above sea level. He discovered an active volcano, height 12,390 feet, which he named Mount Erebus. No vegetation was found in South Victoria Land. Snow lies perpetually about 18° farther toward the Equator than in the Arctic region and the expanse of ice is grand and wonderful.

Three recognized routes have been located in exploring the Antarctic Circle, which extend southward from Tasmania, Patagonia, and the island of Kerguelen. James Cook circumnavigated the Antarctic Ocean in 1773-74. The route followed by him is the one from Tasmania, along which line the most important discoveries have been made. These include the discovery of Wilkes' Land by D'Urville in 1840, Victoria Land by J. C. Ross in 1841, and the exploration of Victoria Land by Scott as far south as $77^{\circ} 21'$. A hazardous voyage was made by J. Biscoe on the Kerguelen Island route in 1831, when he discovered Enderby Land. A German expedition under Dr. Drygalski in 1902 discovered Kaiser Wilhelm Land. N. B. Palmer was the first American to follow the Patagonia route, in 1821, and discovered the Palmer Archipelago. At the same time a Russian expedition under Bellingshausen discovered Alexandria Land, and Biscoe discovered Adelaide Islands and named the region known as Graham Land. Belgica Strait, west of Palmer Land, was discovered by the Belgian expedition under De

Gerlache in 1897-99, and O. Nordenskjöld made explorations east of Palmer Land in 1902-04.

Ernest H. Shackleton, a lieutenant in the British navy, has the record at present of approaching the South Pole more closely than any other navigator. He sailed in the *Challenger* and attempted to reach the southern apex of the earth's axis by sledges. On Jan. 9, 1909, this party reached $88^{\circ} 23' S.$ Lat., $162^{\circ} E.$ Long. The four men with sledges came within 111 miles from the South Pole. Roald Amundsen discovered the South Pole in 1911 and unfurled the flag of Norway. Shackleton also reached the South Pole in 1912. The ice and land region of Antarctica is larger than Europe and the elevations are higher than those of Asia.

The Antarctic region is a bleak and barren waste. Seals and other aquatic animals are found as far south as Victoria Land, but there is no animal life on the land except a few insects and migratory birds. The regions known as Victoria Land, Alexandria Land, Wilkes' Land, and Kaiser Wilhelm Land are not well defined and careful explorations have not been possible. Plants are entirely absent or primitive, and the interior is ice-capped thousands of feet in depth. It is conceded that the cold is more intense in the high latitudes of the Antarctic region than in corresponding latitudes of the Arctic Ocean, and that little of value can be accomplished by explorations aside from the benefits resulting from an addition to knowledge.

POLARITY (pō-lăr'ī-tŷ), the quality of having opposite poles, especially the existence of two points possessing contrary tendencies. Polarity may be illustrated by the opposite tendencies in polarized light, by attraction and repulsion at the opposite ends of a magnet, and by the polarity of the earth. A spherical body at rest cannot be said to have definite poles, since its aspect is similar from every direction, but it assumes the quality of a polar body as soon as it rotates around some fixed diameter. The earth rotates around its polar diameter, hence it is a polar body, and the two ends of the axis form its North and South poles. Right and left direction and height and depth may be estimated only from a particular object fixed in place. Thus to a person north of the Equator the sun and other celestial bodies apparently move from left toward right, while to one south of the Equator they appear to move from right toward left.

POLARISCOPE (pō-lăr'ī-skōp), an optical instrument for examining substances in polarized light, or for measuring the polarization of light. Various forms have been devised. The important parts of the instrument consist of a polarizer, for polarizing the light, and an analyzer, by which it is observed, usually after passing through some medium to be experimented upon. An excellent polarizer may be made by fixing a glass plate at the proper angle and

then applying a small Nicol's prism, or a piece of Iceland spar or tourmaline.

POLARIZATION OF LIGHT (pō-lēr-ī-zā'shŭn), in optics, a change produced upon light so that its reflection and transmission are caused to vary with the position of the surface that reflects it, or of the medium which transmits it. All sides of a ray of light from the sun or any luminous body exhibit the same properties, but if it be reflected or refracted the different sides exhibit different properties. It is then called *polarized light*. Polarized light cannot be detected by the unaided eye. It is studied by means of an instrument consisting of two parts, one to polarize the light and the other to show that it is polarized. The former is the polarizer, the latter is the analyzer, and the two in combination with the necessary adjustments constitute a *polariscope*, of which there are many forms. A number of mediums by which light may be polarized have been discovered. Among the various ways are its transmission through Iceland spar, or some other crystal that possesses the property of double refraction; by reflection from polished wood, water, glass, or other nonmetallic substance; by transmission through transparent uncrystallized plates; and by transmission through a number of bodies imperfectly crystallized.

A simple experiment consists of cutting two thin plates of the crystal tourmaline parallel to the axis of the crystal and passing light perpendicularly through them. If the two be placed parallel to each other, some of the light is absorbed, but what passes through becomes polarized. If the two pieces be placed so the axes of the crystal cross each other, the light is quenched, since the part passing through the first plate is polarized, but it is stopped by the second plate when crossed. Iceland spar is peculiar for its double refraction and an object viewed through it appears double. If the crystal be placed over a dot and turned around, two dots are seen; one being apparently nearer than the other and revolving around as the crystal is turned. A word can be made to appear double in like manner. Tourmaline is a double-refracting crystal in which the ordinary ray is absorbed unless the plate be made exceedingly thin. If a thin plate of it be placed between the eye and a rotating crystal of spar, it is observed that the dots alternately disappear, thus showing that the two beams are polarized at right angles to each other. In reflecting light from glass, the polarizing angle of incidence is about 56° . Other substances polarize light by reflection, but only at the proper angle from them.

The polarizing angle of incidence at which light is most copiously reflected is called the *plane of polarization*. The wave theory offers the only satisfactory explanation of polarization. According to this theory, polarization is a change in the form of the ether waves. These waves resemble water waves in that they are

transverse, but instead of the vibrations being in one plane, as in a water wave, the ether vibrations are in all possible planes across the path of the wave. Hence, if we could look at the end of a ray of light coming toward us, as we can at the end of a rod, we should see the molecules of ether vibrating across the direction of the ray in all possible planes. All these vibrations are reduced to two sets by a polarizer, as is shown by placing a plate of tourmaline between the eye and the rotating crystal of spar. One of them is called the *ordinary* and the other the *extraordinary* beam.

POLAR LIGHTS. See *Aurora Borealis*.

POLDER (pōl'dēr), the name applied in the Netherlands to redeemed land lying below the level of the sea, or below an adjacent lake or river. It is protected from overflows by dams, and there are embankments at regular intervals by which the water is carried to the river or sea. Pumps and other apparatus are employed in lifting the water upon the embankments. Usually the water is accumulated in centers by canals, often a network of connected channels, the lifting apparatus being placed at regular intervals. The most important polder is the redeemed Haarlem Lake. The land reclaimed in this manner is among the most fertile in Europe.

POLE, either of the two extremities of the axis of a sphere, around which it rotates. The northern one of the earth is called the North Pole, and the southern is designated the South Pole; each is 90° from the Equator. The term is applied in astronomy to the two points of the heavens that appear to be touched by the axis of the earth, and around which the heavens apparently revolve. These points are called the *celestial poles*, and, since no stars indicate their exact position, the polestar is reckoned from as the basis by the people north of the Equator. The term is applied in an enlarged sense to a line passing through the center of a great circle perpendicular to its plane. In this sense the *zenith* and the *nadir* are the poles of the horizon. A like application is made to the poles of a meridian and of the ecliptic. The term may be used in the same sense when speaking respectively of the celestial and terrestrial poles as the poles of the equinoctial and Equator.

In physics the poles are two points at which opposite quantities are concentrated, which are distinguished as *positive* and *negative*, as the two poles of a battery and the poles of a magnet. The magnetic needle varies 90° from a horizontal position at the *magnetic poles* of the earth. These poles have not been definitely located and it is not certain that they are stationary. Captain Amundsen, in 1906, designated 70° N. Lat. and 100° W. Long. as the location of the North Magnetic Pole.

POLECAT, a carnivorous mammal of the weasel family. It resembles the skunk in having glands that secrete a liquid substance with

a disagreeable odor, which it ejects when scared or irritated. The polecat has a brown color and bears a valuable fur. Its body is from fifteen to twenty inches long. The tail measures six inches, and the body is about seven inches in height. It sleeps by day, but comes out at night in search of food, feeding on newts, mice, rats,

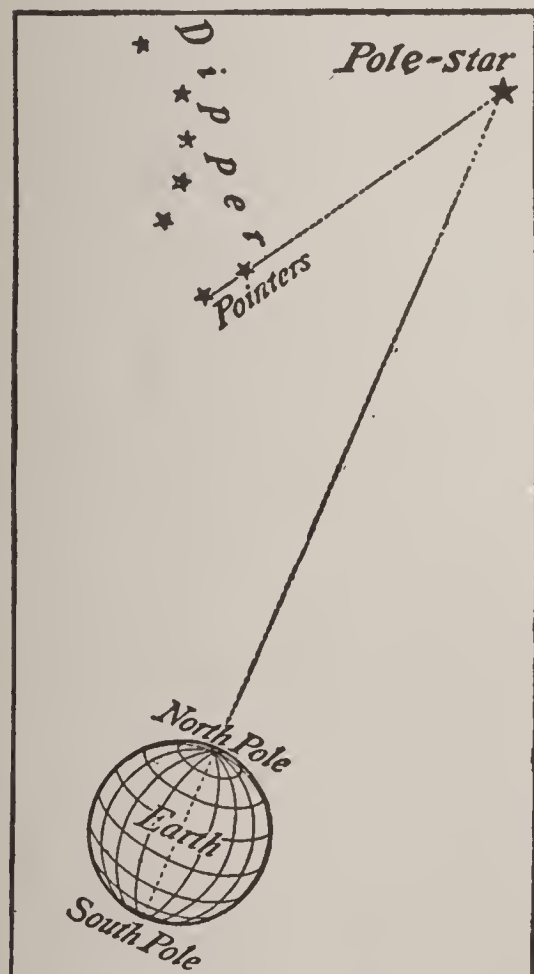


POLECAT.

frogs, birds, and poultry. Polecats are native to Europe and Asia. They are sometimes called *fitchet*, and their fur is termed *fitch*. The skunk of North America and the badger of South Africa resemble the polecat.

POLESTAR, or **Polaris**, the principal star of the constellation Ursa Minor, located at the extremity of the handle of the Little Dipper. It is situated about $1^{\circ} 20'$ from the celestial north pole, and from

time immemorial has been called the *north polar star*. As it is of the second magnitude, it is of great value in navigation north of the Equator. On the Equator it is seen at the horizon, and if an observer could stand at the North Pole it would appear directly overhead. The Polestar can be easily found, since the two stars known as



pointers in the Great Dipper, or Ursa Major, indicate the direction. Find the pointers, as shown in the illustration, and proceed northward about five times the distance of the two

stars from each other. Six of the nine pyramids at Gizeh, Egypt, have openings toward the north. A person standing at the openings 4,000 years ago would directly face Thuban, which was then the north star. The supposed date of the building of the pyramids, in 2123 B. C., accords with that epoch. In the same manner, Polaris approaches and recedes from the North Pole, though the period covers many thousands of years.

POLICE (pō-lēs'), a body of executive officers who are charged with the duty of maintaining the quiet and good order of communities and cities. In some countries a police force is maintained to preserve civil order in the army, as distinguished from the officers vested with power to maintain military discipline. In others a civil police is supported as a general military organization, as the *gendarmerie* in France and the *constabulary* of Ireland. The police systems differ widely in their organization and control as well as in the duties of their officers. In general, the police comprises officers maintained by the authority of towns and cities, each municipality having its own police administration. The police systems of Canada and the United States are quite similar to the form of organization maintained in most of the cities of Europe, especially Great Britain, Sweden, Germany, and Switzerland. However, in many countries the police force is more generally under the direction of states than in the American cities and the officers are often controlled more directly by the rulers.

In former times European cities were entirely under the supervision of officers directed by the state or province, or this force was supplemented by a local police employed to patrol the city for the suppression of crime and the protection of life and liberty. This system was quite unsatisfactory, since the watchmen were inefficiently supervised by a local central superintendent. England was without a modern police system until in 1829, when Sir Robert Peel organized the metropolitan police for London, and since then the burroughs, counties, and cities have established similar local authority for municipal or district protection. The policemen in all the larger cities may be distinguished by a particular uniform, but besides those employed as open peace officers, there are secret policemen, more commonly known as *detectives*, who are not uniformed.

The several states of the United States have general power through the Legislature to found and maintain systems of peace officers. Police regulations may be established by Congress separately, but this function is applied only to the army and during times of insurrections. The several states have provisions for maintaining peace officers in the townships and counties, but these are elected and remunerated

by the people locally. In counties they are known mainly as *sheriffs* and in townships and towns, as *justices of the peace* and *constables*. The police officers proper are provided for by law as officials in organized towns and cities, and are usually appointed by the mayor with the approval of the city council, though in some cities the mayor appoints a board of police commissioners, with the consent of the aldermen, and in this board is vested the power to appoint and supervise the police. In some states, as in Indiana and Missouri, the power to appoint policemen for the larger towns and the cities is vested in the Governor.

Though the police systems of the large cities are somewhat differently organized and the duties of the various classes of police officers differ somewhat, in the main the regulations present the same general features. New York City being the largest municipality in America, we give in this article the main features of its police system. Up to 1845 New York had the night-watch system as its main organization for maintaining the peace, but in that year an efficient police organization was established under a board of four police commissioners, and this was somewhat modified when Brooklyn became a part of Greater New York. At present the police regulations are as efficiently supervised as those of any large city in America. Besides the general superintendent and his direct assistants, there is a well-organized office force, including clerks and stenographers. Photographers are employed to make portraits of persons held on suspicion, and an adequate force of patrol sergeants and patrol policemen is on duty. The mounted policemen have charge of outlying districts, over which they make frequent trips. The police department has charge of those who keep the streets clean. They inspect premises and sewers and see to the enforcement of the general sanitary regulations. To facilitate the work of keeping the peace, they are assisted by a force of detectives, and have ambulance wagons for the care of men and animals that become disabled by accident or otherwise. In connection with the police department are detention camps and hospitals for the care of the sick and wounded.

The general plan at present is to divide the larger cities into inspection districts, which are subdivided into precincts. Special policemen are put on for duty on particular occasions, as in the case of festivals and similar large gatherings of people. London has the largest police force in the world, a total of 16,500 in 1909. In the same year New York had 8,850; Paris, 8,125; Berlin, 6,480; Vienna, 4,642; and Chicago, 4,225. In most instances the number of policemen per 10,000 of population in the large cities ranges from twenty to thirty. The total expense for police protection in New York is about \$12,500,000 per year.

POLILLO (pō-lē'yō), an island of the Phi-

ippines, located off the eastern shore of Luzón. A number of other small islands lie adjacent to the coast. It has an area of 294 square miles and the group has 405 square miles. Polillo and a number of adjacent islands are included for administrative purposes with the province of Tayabas, a political division of Luzón. Population, 1916, 1,608.

POLITICAL ECONOMY (pō-līt'ī-kā ē-kōn'ō-mŷ), or **Economics**, the science of the industries. As such it aims to investigate and explain the nature, relations, and laws of human wants, work, and wealth—three essential factors and elements of the industries. No precise definition of political economy can be formulated, since, as a science, it is in process of formation, and no science can be clearly defined until it has been finished. The study of this science involves three stages, those of observation, imagination, and verification. Notions of economic laws are obtained by the observation of facts, mutual relations between certain groups of facts are established by imagination, and correspondence between the facts is established or disproved by observation. When, after careful investigation, agreements are discovered the facts are said to be verified.

HISTORICAL. Much has been said and written on political economy from remote antiquity, but practically all the extensive treatises date back little more than a century. A number of Greek philosophers made investigations, but most of them applied ethics as an essential element in the discussions, particularly Plato and Xenophon. Aristotle discussed the functions of money as an instrument of exchange and a measure of value. He treated the advantages of the division of labor, called attention to the evils resulting from over-population, and distinguished between value as applied to exchange and value in use. Hesiod is regarded the first Greek writer to give more than passing attention to economical and industrial subjects. In his "Work and Days" he recognizes the gods as the ultimate disposing influence in the different branches of human economy.

The Romans were practical, realistic, and utilitarian, but they developed no vastly diversified system of production and exchange. This is due to the fact that their state was organized rather for military and political purposes than for the development of industries on the field and in the factory. Many Romans looked upon industrial arts and commerce as ignoble pursuits, even Cicero sharing that view. He joined Cato and Varro in advocating the culture of the soil rather than developing trade and manufactures. However, Pliny gave some attention to discussing value as applied in the industries. He showed the evil effects of transporting money from Rome, and looked upon servile labor as equally injurious to both the laborers and to the state.

The Middle Ages comprise a vast transitory

period in the economic activity of Europe. Feudalism was a hindrance to the growth of the industries, since the feudal lord denied the laborers a fair share in the distribution of wealth and levied taxes largely with a view of oppressing the laborer and maintaining the feudal system. With a gradual overthrow of feudalism, labor began to develop in a freer atmosphere, and one by one the fetters of serfdom were broken down. In the 16th and 17th centuries the spirit of colonization caused many Europeans to emigrate to new and undeveloped fields, and the spirit of enterprise at home received a marked impetus by the wholesome reforms resulting from free cities and the beginning of more extensive manufactures. Shortly after the great inventions that revolutionized all branches of industry followed, and in the 18th century such works as Hume's "Economic Essays" and Adam Smith's "Wealth of Nations" had a wide influence in revolutionizing public thought.

SCHOOLS OF ECONOMICS. Several widely different schools of political economy are recognized, including the liberal, Christian, socialist, and historical or realistic. The *liberal school* is sometimes called the *classical*. Its main doctrine is that human societies are governed by natural laws which we could not alter, even if we wished, since they are not of our making. The laws governing wages, capital, and distribution are thus looked upon as natural laws, and their effects as inevitable. The gradual elevation of humanity is thought to result from the efforts made by men and governments to observe these laws. According to the *Christian school*, providential laws govern all social and physical facts, but their effect upon the institutions may be seriously deranged by the action of man himself. John Stuart Mill pointed out that, no matter what class might possess absolute power in a community, it would result in harm to the other classes, and this argument he applied against the Christian school of economists.

The *socialist school* holds that modern society is organized on an improper basis as the result of a long series of acts of injustice, which have been to some extent sanctioned by written laws. Its main opposition is directed against free competition and private property, holding that these are the two great causes that sacrifice social to private interest, and cause the wealth of a community to concentrate in the hands of a few individuals, while the great mass of people are disinherited. Karl Marx, of Germany and Proudhon, of France, are among the many writers who have contributed works of remarkable influence to the literature of socialism. The *historical* or *realistic school* stands in direct opposition to socialism and had its origin in the German universities about fifty years ago. Roscher's "Treatise of Political Economy," published in 1854, is properly the

beginning of this line of study. The realists turn to history for a study of social and economic facts and base their teaching upon the observation of conditions. They include many of the leading statesmen of all civilized nations. Much of the labor legislation of the past twenty years is due to movements promoted by them, and they have set on foot a plan to effect international regulation of labor. The realists have gained an advantage over the liberalists, because they hold that governments may make laws to govern capital, wages, and distribution; over the Christian school, in that they recognize possibilities for all people of whatever faith; and over the socialists, because of looking upon free competition for all as a fundamental basis of human happiness.

ELEMENTS TO CONSIDER. Most writers limit wealth to the quantities which have the three essential characteristics of utility, difficulty of attainment, and transferability. *Value* is a relative term, and may be defined as purchasing power and as power in exchange. The four branches or subdivisions into which political economy is divided are production, consumption, exchange, and distribution. *Production* treats of the creation of wealth. The three direct agents of production are land, labor, and capital, but the guardianship of government is taken into account as an indirect agent to facilitate it. *Land* comprises all natural resources, as soil, water, forests, and minerals still in natural deposits. *Labor* is defined as the human efforts and sacrifices voluntarily directed toward the production of wealth. *Capital* is the result of previous labor employed for further production. *Consumption* treats of the use of wealth and is either productive or unproductive, the two differing in that productive consumption is a use of wealth resulting in the increase of value. *Exchange* comprises the transfer of commodities between different parties, and depends in volume and commodity values upon supply and demand.

A discussion of exchange involves a consideration of the question of money, the laws of exchange, protection and free trade, banks and banking, public and individual credit and trusts. *Distribution* implies a division of wealth among those who have had a share in producing it, including the landowner, the laborer, the capitalist, and the government. This subdivision of political science is one that is receiving more and more attention from all classes, and the laws favorable to an equitable adjustment by awarding each individual the share to which he is entitled are largely of modern origin. However, other themes are concerned more or less with this particular question, but those relating to the effects of high and low wages as compared with the cost of living are immediately involved. Among the different themes engaging the attention of writers on this branch of political economy are

those of unrestricted trade, artificial control of the principal products, over and under production, and the remedies for low wages. The means of relief proposed include trades unions, coöperative associations, and copartnership in industry. The effect of immigration upon wages, the wages of women, rent, interest, and taxation are other questions receiving attention. See **Money; Free Trade; Labor;** etc.

POLITICAL OFFENSES, the acts that are considered injurious to the safety of the state or nation, or which render a subject or citizen disloyal to the supreme authority. They include treason and any other acts of disloyalty and treachery intended to deliver the country or any part of it over to an enemy. In modern times nations have been lenient in dealing with political offenders, and usually they are not compelled to deliver them under extradition treaties. However, much severity is practiced in some countries, as in Russia, where General Stoessel was punished by life imprisonment for the surrender of Port Arthur in 1905, although military experts justified his course. Another instance is that of Col. Arthur Lynch, a subject of Great Britain, who was sentenced to life imprisonment on conviction of treason for aiding the Boers in the Anglo-Boer War. The term political offenses is sometimes used in government to describe the acts of a public official who exercises undue influence in furthering the interests of his political party.

POLITICAL PARTIES IN THE UNITED STATES, the voluntary associations or organizations of citizens to further certain policies through united political action. During the Revolutionary War two political parties were formed, Whigs and Tories, taking the English names. The Whigs were in favor of independence, the Tories preferred to remain as English colonies. After the Revolution the principal controversy was due to the jealousy between the states. The smaller states feared they would lose their autonomy, hence were alarmed by every movement of the sister states. Finally the Federal Constitution was adopted and the government began under it. Washington received a unanimous election as President. Then commenced the crystallization of political parties.

STRICT AND LOOSE CONSTRUCTIONISTS. The critical condition of the country made the adoption of the Constitution a necessity, but the opposition to it was widespread, because of jealousy between the states and a deep-seated fear of a strong central government. Hence, two parties soon crystallized, called *Federalists* and *Democratic-Republicans*. These parties differed in their views of the Constitution. The Federalists were the *Loose*, or *Broad Constructionists*, and the Democratic-Republicans were the *Strict Constructionists*. Washington was a Federalist and his party succeeded in forming a strong central government. John Marshall,

who became Chief Justice of the United States Supreme Court, did much to strengthen the national power.

During Washington's administration (1789-1797) party spirit ran high. The controversy between the two parties became intense. The attacks made upon Washington were severe, uncalled for by the facts in the case, coarse, and unfeeling. He himself characterized them as "so exaggerated and indecent as could scarcely be applied to a Nero, a notorious defaulter, or even to a common pickpocket." His farewell address will always remain as his dignified answer to the attacks made against him by his political enemies.

In the administration of John Adams the country was divided by a sharp difference of opinion upon questions growing out of the French Revolution. The Alien Law, passed in 1797, and the Sedition Law, enacted the same year, became exceedingly unpopular. They were enacted by the Federalists and did much to hasten the downfall of that party. The reaction was so great that in the presidential election, in 1800, the Federalist party was absolutely swept out of sight and Jefferson was elected. This reaction caused the passage of the Kentucky Resolutions and the Virginia Resolutions, which constituted the first authorized proclamation of the Strict Construction party.

PURCHASE OF LOUISIANA. The most important event in Jefferson's administration (1801-1809) was the purchase from France of the Louisiana Territory. Jefferson did not plan it, for he desired to buy only the island of New Orleans. The purchase of the whole province, of more than 900,000 square miles of territory, however, was so decidedly for the benefit of the nation that neither the President nor the Senate could reasonably refuse to ratify the treaty. As a matter of fact the purchase was not unconstitutional, but extraconstitutional. By this purchase the extent of the country was more than doubled.

WAR OF 1812. During Madison's administration (1809-1817) occurred the war with Great Britain, called the *War of 1812*. The two great parties were divided upon this subject. The Democrats as a whole favored the war and the Federalists, being more largely a commercial party, were opposed to it. Congress was overwhelmingly Democratic and war was declared. The people were sharply divided and party spirit ran high, but after peace was proclaimed, in 1815, these differences of opinion rapidly vanished, and the Federal party ceased to exist.

ERA OF GOOD FEELING. In 1817 Monroe became President and his administration (1817-1825) was characterized as the *Era of Good Feeling*. During this period, however, important questions arose which subsequently assumed gigantic proportions. In 1819 the government purchased Florida from Spain. Here was another illustration of the Strict Construction

party violating its principles and going beyond its interpretation of the Constitution. The application of Missouri for admission as a State (1820) raised the slavery question and paved the way for a readjustment of the political parties. The dispute was compromised by admitting both Maine and Missouri (a free and a slave State) and forever prohibiting slavery in the country north of latitude 36° 30'.

TARIFF AND INTERNAL IMPROVEMENTS. From the first the tariff question had been an issue of contention, the Democratic party favoring a tariff for revenue only and the Federalists insisting on a tariff for protection of American industries. In 1823, Monroe, in his message to Congress upon the war then existing between Spain and her revolting colonies, declared that this government would not interfere in any European colonies now existing on this continent, but we should consider any attempt by the governments of Europe to secure additional territory here as hostile to our interests. This has been called the *Monroe Doctrine*, and without any legal sanction it has become the settled rule of the foreign policy by all the political parties.

The next year the noted tariff of 1824 was adopted by Congress, the Loose Constructionists having a majority, and since that date the country has had a protective tariff. The presidential election of that year was a singular one. As there were no political parties, the contest degenerated into a struggle for individuals, and the election was determined by the House of Representatives. John Quincy Adams was elected. By this time the Strict Construction party, hitherto called the *Democratic-Republican* party, had come to be known officially as the Democratic party. The followers of the principles of Clay and Adams took the name of the *National Republican* party, which after a few years was changed to the *Whig* party. This party was the party of Loose Construction ideas, and it strongly advocated a protective tariff. The Whig party continued its existence for about a quarter of a century, but was in power only a small part of the time. The Democratic party has remained through many vicissitudes to the present time and had control of the government between 1830 and 1860, except two presidential terms.

As the years passed the opinion of men in both parties gradually turned in favor of internal improvements. In 1830 a harbor improvement bill was enacted and two years later Congress appropriated \$1,200,000 for internal improvements.

NULLIFICATION IN SOUTH CAROLINA. The people of the Northern States were largely interested in manufacturing, while those of the South were almost entirely engaged in agriculture, especially in the raising of cotton. The North favored a protective tariff, which was opposed by the South. The people of South Carolina under the leadership of John C. Cal-

houn were believers in State rights. They held to the practical supremacy of the states and believed that the Federal government was only a confederation of states for certain purposes, which could be broken at any time by any aggrieved State. They contended that, if any State thought that a law passed by Congress was detrimental to the best interests of the people of that State, they could refuse obedience and annul the law, so far as that State was concerned. This was called *Nullification*.

Hence, when the tariff of 1832 was passed by Congress, which recognized the principle of protection as a policy of the United States, the people of South Carolina, by representatives in convention assembled, formally declared the tariffs of 1828 and 1832 to be "null, void, and no law, not binding upon South Carolina, her officers and citizens." This ordinance was to take effect in February, 1833. In the autumn following, the State Legislature proceeded to make the State ready for war.

But the President, Andrew Jackson, had no sympathy with John C. Calhoun and his doctrines, and he soon made it clear that the whole power of the United States would be used to maintain the national authority over the offending State. Congress, under the leadership of Henry Clay, promptly passed a new tariff law, known as *Clay's Compromise Tariff Law*. This law agreed upon a gradual reduction of the tariff until the year 1842, when the duties on all imports should be uniformly twenty per cent. Upon this South Carolina repealed the nullification ordinance and accepted the existing conditions. In the meantime the country was agitated over the questions relating to the National Bank, the removal of the deposits, the subtreasury, and the Senate's *Resolutions of Censure* of the President.

ANTI-MASONIC PARTY. In 1832 the new *Anti-Masonic* party arose. An opposition to the society of Masons had appeared in western New York. It grew out of a book published in opposition to Free Masonry. William Morgan, who had been active in opposing Masonry, suddenly disappeared and never was seen again, at least in America. It was alleged that he was kidnapped by the Masons. A party was soon formed in western New York, pledged to oppose the election to a public office of any man who was known to be a Mason. This party acquired some influence in several states and in Vermont succeeded in electing Anti-Masonic presidential electors. The principles of the party were quite similar to those of the National Republicans, later called Whigs. The Anti-Masonic party soon disappeared.

POLITICAL CONVENTIONS. In 1832 all the political parties held conventions for nominating a candidate for President. Previous to that year other methods had been employed. At first the men of each party in Congress had made the nominations. Legislatures in various

states had made nominations, but now by a convention of delegates from all the states each party nominated its candidates for President and Vice President. This method is still in force.

ANTI-SLAVERY SOCIETY. The founders of the republic considered slavery as an evil, but near the close of the 18th century the invention of the cotton gin had made slavery profitable in the Southern States. The Northern States were opposed to slavery and many people believed slave holding to be a crime against humanity. In the years 1832 and 1833 the American Anti-Slavery Society and numerous branches were formed. The people of the slave-holding states were seriously alarmed at the growing anti-slavery sentiment in the North and many in the free states were opposed to the agitation of the question, fearing that it would prove dangerous to the peace of the Union. Those composing the extreme Anti-Slavery party were called *Abolitionists*. Severe opposition to the Abolitionists in various sections of the Union and stringent laws in the Southern States tended only to increase the numbers of the Anti-Slavery party and to render more intense their agitation against the slavery system. Both of the larger parties, the Whigs and the Democrats, were opposed to the extreme measures of the Abolitionists.

FINANCIAL PANIC OF 1837. Andrew Jackson, having served two terms as President, was succeeded, in 1837, by his friend Martin Van Buren, who promised "to follow in the footsteps of his illustrious predecessor." Jackson's financial policy had seriously weakened confidence in some sections and the immense amount of paper money circulated by the State banks and the effect of the *Specie Circular* of 1836, in producing an enormous demand for gold and silver—all these things together—brought about a severe financial panic in the first year of Van Buren's administration. Specie payments were generally suspended. An extra session of Congress was called. Banks and corporations were wrecked and prices dropped to an alarming extent. It was the most severe financial panic the country had then ever seen.

ELECTION OF 1840. The election of President in 1840 was unique. Van Buren's financial policy had created a strong opposition to him and the campaign was an exciting one. The Liberty party nominated James G. Birney, the Democrats nominated Van Buren, and the Whigs named William H. Harrison and John Tyler. Harrison was an old-time Whig. Tyler was a Strict Construction Democrat of the Calhoun type, who had broken away from his party. Harrison and Tyler were elected. The election of Harrison was the first time a Whig had been chosen to that office. Harrison died after serving a month and Tyler became President. Throughout his term he was in constant opposition to Congress.

ANNEXATION OF TEXAS. For nearly fifty years the balance of power had been kept up in the Senate, but with the large territory in the northwest out of which free states could be carved and no territory in the southwest for new slave states, the southern statesmen saw clearly that it would soon be impossible to keep up this balance of power in the Senate. Hence, it was important for them to acquire additional territory in the southwest. In 1844 the annexation of Texas became an absorbing party question. The Liberty party nominated James G. Birney for President, the Whigs nominated Henry Clay, and the Democrats nominated James K. Polk. Polk was strongly in favor of the annexation. Clay wrote, during the campaign, a letter in which he said that he would favor the annexation at some future time. This lost him many votes in the North and gained him none in the South. Polk was elected. Late in the session of 1844-1845 Congress voted to annex Texas and Tyler signed the bill before his term expired. Texas accepted annexation and in December following was admitted as a State.

OREGON QUESTION. Title to the Oregon country was based on: The right of discovery by Capt. Gray, in 1792; government exploration by Lewis and Clark, in 1805; the first actual settlement at Astoria, in 1811; and the purchase of the rights of Spain, in 1819. The boundary was in dispute between Great Britain and the United States for many years. In the presidential campaign of 1844, the Democrats urged two propositions, the one favoring the South and the other designed to conciliate the North—the annexation of Texas and a territorial government over the entire Oregon country from 42° to 54° 40'. "Fifty-four-forty or fight" was the watchword. However, after the election of Polk the interest in Oregon gradually diminished so that in 1846 a treaty was negotiated with Great Britain, fixing the northern boundary as 49° westward from the Rocky Mountains.

WAR WITH MEXICO. Mexico had not acknowledged the independence of Texas. Besides, the territory between the Nueces and the Rio Grande was in dispute between Texas and Mexico. In March, 1846, the President ordered General Taylor to advance with his army and occupy this disputed territory. This movement precipitated war. Three months later Polk asked Congress for an appropriation to purchase territory from Mexico. This brought up the slavery question, for it was well understood that this territory was destined to be carved into additional slave states. In the House, Wilmot of Pennsylvania offered a proviso, applying to any newly acquired territory the provision of the Ordinance of 1787, that "neither slavery nor involuntary servitude shall exist in any part of said territory, except for crime, whereof the party shall first be duly convicted." This was called the *Wilmot Proviso*.

It passed the House, but failed in the Senate. It was favored by the Whigs and northern Democrats. A treaty of peace was made with Mexico in 1848. By this treaty Mexico sold to the United States a large territory, then called New Mexico and Upper California. For this territory, embracing about 600,000 square miles, was paid the sum of \$15,000,000.

The same year Oregon was organized into a Territory, without slavery. In 1848 the Democrats nominated Lewis Cass. The Whigs nominated Zachary Taylor and Millard Fillmore. A new party was formed, called the *Free Soil Party*, which put in nomination Martin Van Buren. This new party was supported by many northern Democrats and by the Liberty party. The election resulted in the triumph of the Whig party. The executive for the next four years, from 1849 to 1853, was Whig, but the legislative department was decidedly Democratic. *Squatter Sovereignty* (q. v.) now became a much talked of question. The South expected that in the Mexican territory slavery would be admitted, but in this it was disappointed.

CALIFORNIA AND THE DISCOVERY OF GOLD. Scarcely had the treaty with Mexico, by which she ceded to the United States her northern provinces, been negotiated, when James Marshall discovered gold in Captain Sutter's race course. People flocked to the gold diggings from all parts of the Union. Many of them were from the North, every State being represented. In November, 1849, a constitution was ratified, under which California, in February, 1850, applied to Congress to be admitted as a State. This constitution absolutely prohibited slavery. In the House of Representatives neither party had a majority, but the balance of power was in the hands of the new Free-Soil party.

From the inauguration of General Taylor, a slaveholder, as President, until the year 1856 the Whig party continued to lose ground. It lost the antislavery men of the North and the proslavery men of the South. The northern Whigs joined the Free Soil party, and the southern men allied themselves with the Democrats. *Squatter Sovereignty*, or *Popular Sovereignty*, became the watchword of the Democratic national convention.

COMPROMISE OF 1850. Early in the year 1850 Clay submitted a compromise proposition, which, after prolonged discussion and some changes, passed and became a law. The measures were substantially as follows: The admission of any new states from Texas, the admission of California, the organization of the territories of New Mexico and Utah, the payment of \$10,000,000 indemnity to Texas, a rigid fugitive slave law, and the abolition of the slave trade (but not of slavery) in the District of Columbia.

The passage of the fugitive slave law was es-

pecially distasteful to the North. It produced the enactment of sundry personal liberty bills by northern legislatures. President Taylor died in 1850 and Millard Fillmore became President. The controversy concerning the tariff, internal improvements, and a national bank disappeared for a time and the topic of slavery absorbed the attention of the parties. In 1852 the Democrats nominated Franklin Pierce, the Whigs named as their standard bearer Winfield Scott, and the Free Soil party nominated John P. Hale. Pierce was elected.

KANSAS-NEBRASKA BILL. In 1854 came the bitter controversy over the Kansas-Nebraska bill. The Democratic party sought to settle the slavery question by compromising with the North and the South, and the Whig party had largely changed to a Free-Soil party. The Kansas-Nebraska bill proposed to organize two new territories west of Missouri, one called Kansas and the other, Nebraska. By the Compromise of 1820 this territory was dedicated to freedom, but by this bill all the territory north or south of the parallel of 36° 30' should admit or exclude slavery as its inhabitants might decide. This bill finally passed and became a law. The South, Whigs and Democrats, voted for it, the northern Democrats were evenly divided, and the northern Whigs and Free-Soilers were united against it. The northern and southern Whigs were separated, never to come together again. Political parties assumed new lines. The slavery question dominated all national legislation.

At the opening of the Thirty-Fourth Congress, in December, 1855, the Anti-Nebraska men had a majority in the House, but many of them were *Know-Nothings* (q. v.). Neither political party had a majority. The balloting for Speaker of the House continued until February. One hundred and thirty ballots were taken without a choice. The leading candidates were N. P. Banks of Massachusetts and James L. Orr of South Carolina. Finally it was agreed that a plurality should elect. Then Orr's name was withdrawn and Aiken of South Carolina was put in nomination. On the 134th ballot the vote stood 103 for Banks, 100 for Aiken, and 11 scattering. Banks was declared elected.

The Anti-Nebraska men now adopted the name *Republican*. This party soon crystallized its tenets into the following: The Federal government has power to control slavery in the territories, protective tariffs, internal improvements, and national bank currency. The controversy was long and bitter, but the Republican party finally triumphed. In 1856 the Democratic candidate for President was James Buchanan, the Republicans named John C. Frémont, and the American party (*Know-Nothings*) nominated Millard Fillmore. The contest was spirited. Buchanan was elected.

Immediately after Buchanan had taken the chair, the decision of the United States Supreme

Court in the Dred Scott case was announced. This was approved by the South and denounced by the North. According to this decision, Negro slaves were chattels, "who had no rights or privileges but such as those who held the power and the government might choose to grant them." "Congress had no right to prohibit the carrying of slaves into any State or Territory." From this time the nation drifted rapidly toward the Civil War. The whole country was aroused. The presidential election of 1860 drew on apace. The Democratic convention met in Charleston, S. C., and divided into two factions, the northern delegates nominating Stephen A. Douglas and the southern, John C. Breckenridge. The American (Know-Nothing) party reorganized under the name of the Constitutional Union party, declared for the Constitution of the country, the Union of the states, and the enforcement of the laws. It nominated John Bell for chief executive. The Republican national convention nominated Abraham Lincoln, who was elected after an exciting campaign.

CIVIL WAR AND RECONSTRUCTION. Since the Republican party was pledged to prevent the extension of slavery, the South undertook to establish the Confederate States (q. v.). Eleven states seceded and the country was thrown into the Civil War (q. v.), which lasted four years. However, the Federal government was supported by the Republican party and by the great mass of northern Democrats. In 1864 Lincoln was again nominated by the Republicans and George B. McClellan was the nominee of the Democrats. Lincoln was reelected, but was assassinated a few weeks after his second inauguration, and Andrew Johnson, the Vice President, became President. Lincoln had issued the Emancipation Proclamation and the war soon closed. Johnson opposed the congressional plan for reconstruction and the South in the meantime suffered under the *carpet-bag* (q. v.) policy. The Thirteenth, Fourteenth, and Fifteenth amendments of the Constitution were adopted. These were the culminating features of the settlement of the slavery question.

Meantime, in 1868, the Republican party nominated Gen. U. S. Grant and the Democratic candidate was Horatio Seymour. Grant was elected by the votes of the North. He served two terms (1869-1877). In 1872 he was opposed by Horace Greeley, the candidate of the Liberal Republicans and Democrats, and for the first time the Prohibition party made a nomination for President. His second term was not so successful as his first term had been, and serious charges of corruption were made against various officeholders. In 1876 a strong effort to nominate Grant for a third term was frustrated and R. B. Hayes was the Republican nominee. He was opposed by Samuel J. Tilden, the Democratic nominee, Peter Cooper, who was nominated by the Greenback party,

and Greene C. Smith, the Prohibition candidate. The election was disputed and the whole matter was left by a vote of Congress to the Electoral Commission (q. v.). The decision was in favor of Hayes and he was inaugurated. Reconstruction in the Southern States was completed and the carpet-bag régime was ended within his administration. In 1880 the Republican candidate was James A. Garfield, that of the Democrats was W. S. Hancock, and the Greenback candidate was J. B. Weaver. Garfield was elected, but died by the hand of an assassin the following year. He was succeeded by the Vice President, Chester A. Arthur.

TARIFF AND CIVIL SERVICE REFORM. In 1884 the Democrat and Republican parties were divided on the two issues of tariff revision and civil service reform. Grover Cleveland was nominated by the Democrats and James G. Blaine by the Republicans. Several minor parties, such as the Labor party and the Prohibitionists, likewise made nominations. The Democrats carried the election by a large majority, being the first time since 1856. Owing to a lack of harmony within the party on the tariff issue, little was done to reform the tariff, but considerable advancement was made in improving the civil service. Cleveland was a candidate for reelection in 1888, but was defeated by his Republican opponent, Benjamin Harrison. Within his administration, in 1890, the McKinley tariff and the Sherman silver law were enacted. Both measures proved unpopular and were instrumental in defeating the party in the election of 1892, when Cleveland was elected to the Presidency over his Republican opponent, Benjamin Harrison. The *People's* party nominated J. B. Weaver for President, being the first nominee of that party. Simon Wing was the candidate of the Socialists and John Bidwell of the Prohibitionists. The Democrats, having the executive and both branches of Congress, passed the Wilson tariff bill and the income tax law. Since the latter was declared unconstitutional by the Supreme Court, the Mills tariff did not provide sufficient revenue.

MONEY QUESTION. An entirely new alignment was made in the political organizations in 1896, when the money question became the paramount issue. The Democrats, who nominated William J. Bryan, declared in favor of *bimetallism*, favoring the free and unlimited coinage of both gold and silver at the ratio of sixteen to one. William McKinley, author of the McKinley bill, was nominated by the Republicans on a platform which favored higher tariff and the gold standard of coinage. The Democratic nomination was endorsed by the *People's* party. A fraction of the Democratic party, being opposed to bimetallism, organized the *National Democratic* party and nominated John M. Palmer for President. The campaign was one of unusual interest, resulting in the election of McKinley and a majority of Republicans in Congress. Within

this administration occurred the Spanish-American War and the single gold standard of coinage was legalized.

INSULAR POSSESSIONS. Those who opposed the annexation of territory remote from the United States declared themselves against the policy of McKinley, hence became known as *Anti-Imperialists*. This question entered largely into the campaign of 1900, when McKinley, as the Republican candidate, defeated Bryan, his Democratic opponent. However, McKinley was assassinated in 1901 and was succeeded by Theodore Roosevelt, the Vice President. The latter was elected to the Presidency in 1904, defeating Alton B. Parker, the Democratic nominee. During the succeeding administration the policy of McKinley was carried out to a large extent, especially in the administration of government in Porto Rico, Hawaii, and the Philippines. In the meantime much was said in regard to Federal regulation of insurance companies, interstate commerce, and railroads and other common carriers. In 1907 the country was thrown into a panic, owing largely to a scarcity of money in New York City and other business centers, but the stringency subsided and business confidence was soon restored.

CURRENT ISSUES. William H. Taft was nominated for President in 1908 by the Republicans; William J. Bryan, by the Democrats; Eugene V. Debs, by the Socialists; Eugene W. Chafin, by the Prohibitionists; and Thomas L. Hisgen, by the Independents. The issues of the campaign centered largely upon tariff reform, interstate commerce and issues affecting trusts, banks, and common carriers. Taft was elected and announced that he would carry out the policy of his predecessor. However, Congress, although both branches were Republican, failed to reach a conclusion upon the tariff question and the party became divided into two factions.

In 1912 the candidates for President were: Woodrow Wilson, Democrat; Theodore Roosevelt, Progressive; W. H. Taft, Republican; E. V. Debs, Socialist; and E. W. Chafin, Prohibition. Wilson was elected, receiving 454 of the electoral votes, while eight electors voted for Taft and 69 voted for Roosevelt. President Wilson was reelected in 1916, receiving 227 electoral votes, while his Republican opponent, Charles E. Hughes of New York, received 254 electoral votes. In 1920 Warren G. Harding defeated his Democrat opponent, receiving 404 electoral votes and James M. Cox receiving 127 votes.

POLK, James Knox, eleventh President of the United States, born in Mecklenburg County, North Carolina, Nov. 2, 1795; died in Nashville, Tenn., June 15, 1849. His father, Samuel Polk, was a farmer, and his uncle, Thomas Polk, was one of the signers of the Mecklenburg Declaration of Independence. He was brought up on the farm, and, after completing the common school course, secured employment with a merchant, but, disliking commercial pur-

suits, he returned home and was instructed by a private tutor. In 1815 he entered the University of North Carolina as a member of the sophomore class, where he graduated in 1818 as the best scholar in mathematics and classics. This university conferred upon him a degree in law in 1847. In 1819 he entered the law office of Felix Grundy, an eminent jurist of Tennessee, and while pursuing legal studies formed an intimate acquaintance with Andrew Jackson. After being admitted to the bar, in 1820, he established a law practice at Columbia, and in 1823 became a member of the Tennessee Legislature.



JAMES K. POLK.

He married Sarah Childress in 1824. The next year he was elected as a Democrat to Congress, where he served as an influential member until 1839, when he became Governor of Tennessee. When he entered Congress, he was the youngest member with one or two exceptions, and took a leading part in all the noted debates in that body. His first great speech was in favor of amending the Constitution so as to give the people the power to elect the President and Vice President by direct vote. He opposed the appropriation of funds to the Panama Canal on the grounds that it would establish an unfortunate precedent and be likely to involve the United States in war with Spain. During the entire contest between President Jackson and those opposing him in relation to the national bank, he supported the administration, and as a member of the Ways and Means Committee, in 1833, made a minority report unfavorable to the Bank of the United States. He held the office of speaker of the House from 1835 until 1839, and supported President Van Buren with the same ardor extended to President Jackson. The Democratic national convention at Baltimore nominated him for President in 1844. In the election that followed he defeated Henry Clay by a majority of 37,181 of the popular vote, and received 170 of a total of 275 electors.

The chief events of Polk's administration include the establishment of the United States Naval Academy, the annexation of Texas, the admission of Iowa, Texas, and Wisconsin as states, and the war with Mexico. The Mexican War resulted in the United States acquiring New Mexico and California. Other events include the settling the Oregon boundary with Great Britain, reenacting the independent sub-treasury system, passing the act under which the Smithsonian Institution was established, effecting a treaty with New Granada by which citizens of the United States secured the right

of way across the Isthmus of Panama, and creating the Department of the Interior. He declined to become a candidate for reelection and retired to his home in Nashville at the conclusion of his term. His remains were removed by the State to Capitol Square in 1893.

POLK, Leonidas, clergyman and soldier, born in Raleigh, N. C., April 10, 1806; died on Pine Mountain, June 14, 1864. He graduated from the West Point Military Academy in 1827, and soon after became a minister of the Protestant Episcopal Church. In 1837 he was made missionary bishop in the southwestern part of the United States, and three years later became bishop of Louisiana. He was strongly in sympathy with the secession movement, and at the beginning of the Civil War entered the Confederate army as major general. Distinguished services in the Battle of Shiloh caused Jefferson Davis to promote him to the rank of lieutenant general, and he received command of the armies of Kentucky and Tennessee. He commanded in the Battle of Chickamauga and was relieved of his command on the charge of disobeying orders, but received another command in December, 1863. In 1864 he served with General Johnston against General Sherman at Atlanta, and was killed on Pine Mountain by the explosion of a Union shell.

POLLEN (pŏl'lĕn), the name of a substance developed in the interior of the anther of a plant. When it is carried to the stigma of a blossom belonging to the same species, it germinates the ovules so that they develop into perfect seeds. The most common forms of pollen grains are minute triangular or spheroidal bodies, but in unbelliferous plants they are oval, and in some compound flowers they are polyhedral. They consist of two or three layers and within is a cavity filled with a viscid fluid, which is sometimes transparent, but usually is rendered opaque by the minute granules that float in it. When the pollen grain, conveyed by insects, the wind, or other agencies, is lodged upon the stigma, its internal layer is protruded through the outer one in the form of tubes which elongate themselves rapidly and carry the granules downward until they reach the ovule. As soon as this occurs a change takes place in it by which the embryo is originated. This process, called impregnation, is necessary to produce a complete seed. The ovule and ovary sometimes continue to grow and ripen into fruit, but seeds that have not been impregnated prove abortive and do not germinate. Although fertilization takes place if only one pollen grain comes in contact with the ovule, every plant produces many pollen grains, a provision of nature that furnishes protection against loss or destruction of the species.

POLLOCK (pŏl'lŭk), **Sir Frederick**, journalist and author, born in London, England, Dec. 10, 1845. He was educated in Eton and Cambridge and served as examiner of law in

Cambridge from 1879 until 1881. Subsequently he was professor of jurisprudence at University College, London, and at the University of Oxford. He was professor of common law in the Inns of Court from 1884 to 1890, and in the latter year was made a member of the royal labor commission. Besides contributing to magazines and encyclopaedias, he published a number of important law and historical works. These include "Digest of the Law of Partnership," "Principles of Contracts," "History of English Law," "Life and Philosophy of Spinoza," "Introduction to the Science of Politics," "Leading Cases Done into English," "Land Laws," and "Law of Torts."

POLL TAX, a tax levied on each poll or head. Most of the nations levy capitation taxes of varying amounts. The power to collect such a tax in the United States is vested in the Constitution and in the states. However, the national government has never exercised this function and the constitutions of several states expressly forbid it. Those imposing the tax make it from fifty cents to \$3 per year, though disabled persons and those below 21 and over 45 years of age are usually exempt from it. Massachusetts and several other states make its payment a qualification for voting.

POLO (pŏ'lŏ), a game played on horseback and which in some respects resembles hockey. It originated in Asia, where it was played as early as the 8th century, and is thought to be the game mentioned in the "Arabian Nights" as tennis. British cavalry officers learned the game in India and introduced it into England in 1872. It is now a very popular game in Canada and the United States. The game is played on a space marked out on level ground, usually 200 yards wide and 300 yards long. The players are mounted on horseback and are armed with long polo sticks, usually mallets having flexible handles, and with these they endeavor to drive a ball through the goal of the opposing players. The game is played with four or five on each side, and to succeed well requires good horsemanship and trained ponies. Formerly the standard rules required the ponies not to be more than fourteen hands high, but several associations raised the height to 14.2 hands in 1889. A number of American associations are maintained and the game is steadily gaining favor, though it is somewhat expensive and requires well-bred ponies and carefully laid out grounds. American polo players attained considerable success in competing for prizes in the Exposition at Paris in 1900. The national championship was won in 1907 by the Rockaway Hunting Club, of Long Island, at the games in Chicago.

POLO, Marco, distinguished traveler, born in Venice, Italy, about 1254; died there in 1324. He was the son of Nicolò Polo, an eminent merchant, who traveled extensively in Southern Europe and Western Asia about the middle of

the 13th century. Later he sailed with his brother, Maffeo Polo, on a mercantile tour from Venice, and, after visiting Constantinople, they traveled in Persia, Central Asia, and China. In China they were favorably received by Kublai Khan, who manifested a keen interest in their narration of European enterprise and commissioned them to visit the Pope at Rome. They returned to Venice in 1269 and two years later organized a second expedition, which was accompanied by Marco Polo. In 1275 they reached the palace of Kublai Khan and were again favorably received. This sovereign became greatly interested in Marco, since he showed remarkable aptitude in learning the Mongol language, and favored him with appointments on missions to the princes of adjacent countries. Later he became governor of Yang-tchou, a province of eastern China, where he served successfully three years.

The three Polos escorted a Mongolian princess to Persia in 1292, but Kublai died while they were in Teheran, and they resolved to return home, reaching Venice in 1295. In 1296 Marco Polo took part in the great Battle of Curzola, in which the Venetians were defeated by the Genoese, and he was taken a prisoner to Genoa. While in confinement he dictated an account of his travels to a fellow prisoner named Rusticiano, which was entitled the "Book of Marco Polo" and published in 1298. This work was received with much enthusiasm, but the minuteness with which the author described the wealth and beauty of China caused many scholars to regard it fictitious. However, much of it was soon after verified by Christian missionaries and it awakened intense interest in travel, thus leading the Portuguese to double the Cape of Good Hope and to reach Hindustan, while it aroused Columbus to seek a northwest passage and discover America. The "Book of Marco Polo" has gone through many translations and editions and is still a work of much interest.

POLTAVA (pāl-tā'vā), or **Pultowa**, a city of Russia, capital of a government of the same name, at the confluence of the Vorlska and Poltavka rivers. The streets are regularly platted and improved by modern conveniences. Among the manufactures are cotton and woolen goods, machinery, clothing, and leather. It is the seat of several excellent educational institutions, a fine cathedral, and a splendid monument commemorating the victory of Peter the Great in 1709 over Charles XII. of Sweden. It is surrounded by a fertile agricultural country and has an extensive trade in cereals, live stock, and lumber. Population, 1917, 54,842.

POLYBIUS (pō-līb'ī-ūs), noted Greek historian, born at Megalopolis, in Arcadia, about 204 B. C.; died about 122 B. C. He was instructed in the science of politics and military arts by his father, who was a leading member of the Achaean League, and at the age of 24 years

entered public life. In 168 B. C. war broke out between Macedonia and Rome and shortly after 1,000 Achaeans were summoned to Rome by commissioners to show why the Achaeans had not assisted in the defeat of Perseus, the King of Macedonia. Although most of this number were condemned to imprisonment, Polybius secured permission to reside in Rome and while there formed a close friendship with Scipio Aemilianus. In 147 B. C. he accompanied that commander to Africa and the following year witnessed the siege and destruction of Carthage. Shortly after he returned to Corinth, which he found in ruins, and many of the fairest cities of Achaia were in possession of the Romans. Polybius was welcomed by his countrymen. He gained their gratitude by making favorable treaties with the Roman conquerors, and later many statues were erected to his honor. He wrote about forty works on history, of which only five remain entire, while the others are studied from fragments or in extracts made from his writings. The principal work is his "History of Rome," in which he recounts the reasons why that country became powerful.

POLYCARP (pōl'ī-kārp), eminent Christian father, born about 68 A. D.; suffered martyrdom about 154. There is no certainty as to the date or place of his birth, but it is thought that he was educated at Smyrna, where he probably formed the acquaintance of the apostle John. Irenaeus was his pupil at Smyrna, to whom the world is indebted for much information regarding Polycarp and the history of the church in the 2d century. Some writers assert that Polycarp was appointed bishop by the apostle John, though this is doubted by others, but all agree that his connection with the church from early manhood was intimate. He became the head of the church of Smyrna and gathered about him large congregations, to whom he related the accounts received from those who had seen Christ in the flesh. His reputation extended into Macedonia and other regions, and in the latter part of his life he undertook a journey to Jerusalem to visit Bishop Anicetus. On his return to Smyrna a persecution against Christians became widespread, though he labored uninterruptedly for the Christian cause. Popular feeling against the Christians steadily increased, and after the festive games at Smyrna it was decided that Polycarp should suffer unless he would recant. The proconsul wished to save him, but he remained steadfast in the faith and was burned alive. He is the author of a number of homilies and epistles. His "Epistle to the Philipians" is the only one extant.

POLYCRATES (pō-līk'rā-tez), Greek tyrant of Samos, died in the latter part of the 6th century B. C. He was the son of Aeaces, and, taking advantage of a festival to Hera, made himself master of Samos in 536 B. C. After conquering several other islands and a

number of towns on the Asiatic coast, he defeated the inhabitants of Miletus. His rule was eminently successful, since he gave much attention to the development of the arts and industries, and constructed many substantial and famous buildings. His navy included more than one hundred ships, armed with a thousand bowmen. Aristotle relates that he employed his subjects on vast public works to make them satisfied with his reign, and the splendor of his palace was such that Emperor Caligula rebuilt it many centuries later. He collected a library, encouraged learning, and promoted commerce. In 525 B. C. Polycrates formed an alliance with King Cambyses of Persia against Egypt, and sent forty ships to promote an invasion of that country. However, the crew mutinied before reaching Egypt, and soon after returned to Samos. In 522 B. C. the Persian satrap of Sardis, Oroetes, enticed him to Magnesia, where he caused him to be crucified. Herodotus, the Greek historian, found many great buildings on Samos that he assigned to the reign of Polycrates.

POLYGAMY (pō-līg'ā-mŷ), the practice of having a plurality of wives. The term is sometimes extended to the state in which a woman has more than one husband, but that custom is more properly called *polyandry*. Many of the ancient nations of Asia and Africa sanctioned or tolerated polygamy as a religious institution, and it was practiced by the Israelites and the patriarchs, even under the Mosaic law. In the early history of Greece it had some foothold, but disappeared entirely as civilization progressed, and it was never sanctioned by the Romans and the Germanic races. *Monogamy* is enforced in all Christian countries. Polygamy never was tolerated or practiced in the United States, but was sanctioned for a short time after 1843 by the founders of one branch of the Mormon Church, in Utah. It is still practiced in many countries of Asia and various islands of the Pacific, and is sanctioned in practice by the Mohammedans. Polyandry is practiced in some regions of Tibet, in Ceylon, and among certain races of Australia and New Zealand.

POLYGON (pōl'ī-gŏn), a plane figure bounded by straight lines. These lines bound it on all sides and collectively are called *sides* of a polygon. The points at which the lines meet are designated *vertices*, and the entire bounding line is called the *perimeter*. The class to which a polygon belongs depends upon the number of its sides or angles. Those with three sides are called *triangles*; those with four, *quadrilaterals*; those with five, *pentagons*; those with six, *hexagons*; those with seven, *heptagons*; those with eight, *octagons*; those with nine, *nonagons*; those with ten, *decagons*, etc. A polygon which has equal sides is said to be *equilateral*, and, if its angles are equal, *equiangular*. A polygon is said to be *regular* if it is both equilateral and

equiangular, and *twisted* if the sides are not in a single plane.

POLYHYMNIA (pōl-ī-hīm'nī-ā), or **Polymnia**, in Greek mythology one of the nine Muses. She presided over rhetoric and the higher lyric poetry. It is said that she invented rhythm and the lyre. She is represented in statuary in an attitude of meditation, the chin resting upon the right hand.

POLYMERISM (pō-līm'ēr-īz'm), in chemistry, the term applied to the property of compounds which gives them different molecular weights, although they contain the same number of various atoms. When this property is found in compounds they are said to be polymers of one another.

POLYNESIA (pōl-ī-nē'shī-ā), a name usually applied to the extensive archipelagoes of the Pacific Ocean, which include all the islands north of New Zealand and east of the Philippines, New Guinea, and Australia. They include innumerable islands and islets, distributed over about 11,000,000 square miles of ocean. However, their combined area does not exceed 200,000 square miles and the population is not more than 1,800,000. Three principal subdivisions are made of the whole group, embracing Polynesia Proper, Micronesia, and Melanesia, and each of these is again divided into smaller groups. *Polynesia Proper* occupies the largest ocean surface and extends from below to regions far above the Equator. The general direction of the islands of this and the other groups is from northwest to southeast. Besides a large number of scattered islands, it includes the archipelagoes of the Hawaiian Islands, and the Society, Cook, Marquesas, Tokelau, Phoenix, Tonga or Friendly, Ellice, Fiji, Navigator's, and Tuamotu islands. The inhabitants of these islands belong to the Polynesian race, though many different classes of people have formed settlements in various islands.

Micronesia is situated between the Philippines and the northern part of Polynesia Proper, while its southern boundary is formed principally by the Equator. The principal archipelagoes include the Carolines, Ladrões, Marshall Radack, Pelew, Gilbert, and Brown islands. *Melanesia* is situated northeast of Australia, south of Micronesia, and west of Polynesia Proper. It is the most important of the divisions, since it comprises the larger part of both the area and population. Among the most important islands of this group are New Guinea, New Pommern, and the groups of Solomon, Loyalty, Huon, Chesterfield, New Caledonia, New Hebrides, Santa Cruz, Admiralty, Norfolk, and Louisiade islands. Renewed interest has been centered in the northern part of this division within recent years, especially in the Bismarck Archipelago, where commercial developments are being made by Germany, Holland, and Great Britain. Many of the islands and groups of Polynesia have much fertility of soil,

while all have remarkable uniformity of climate, and some are noted for valuable deposits of many minerals. The islands differ in being partly or entirely of volcanic or coral formation.

Darwin and other writers express the view that this vast region was once a continent and that the land became submerged below the surface of the ocean. In this way the general trend of the volcanic islands is accounted for, since they are regarded the more elevated peaks of former mountain ranges. The coral islands have been built up by coral polyps as the surface settled farther and farther into the sea. The highest mountains of the volcanic islands are found in the Hawaiian group, where the peak of Mauna Kea attains a height of 16,810 feet, while the coral islands are only slightly elevated above the ocean.

Most of the inhabitants are Polynesians, though there are many people of Malay origin. The languages differ widely, since various dialects are spoken in the separate groups, and there is a marked difference in the state of social and industrial development. Christian missions were first established in 1797 on Tahiti, an island of the Carolines, and since then successive efforts have been made in all the groups, though the population has been gradually decreasing under the civilizing influence of Europeans. This is accounted for from the fact that these peoples represent the lowest types in the intellectual development of mankind. The products are diversified. They include principally fruits, coffee, cocoanuts, sugar, tobacco, cotton, rice, trepang, and cereals. Live stock is reared in abundance. The first extensive discoveries made were by Magellan, who visited the Ladrões and other islands in 1521.

POLYP (pŏl'ip), one of many small aquatic animals, nearly all of which are inhabitants of the sea. Only two species of fresh-water polyps are known. They live largely in societies and include the corals, hydroids, and polyzoa. The body is cylindrical in form and has a mouth at one end, which is surrounded by a circle of arms or tentacles, in which respect they resemble the many-armed cuttlefishes. This class of animals belongs to the lower scale. They have none of the five senses common to other animals and are incapable of moving from their place. The coral polyps are perhaps the most interesting, since they are the builders of the coral islands.

POLYPHEMUS (pŏl-ĭ-fē'mūs), a noted giant of Grecian legends, son of Poseidon and the nymph Thoosa, who is described as a one-eyed Cyclops. He and the Cyclop race lived in caves in the vicinity of Mount Aetna, where he spent his life in herding flocks of sheep on the mountain side. Ulysses and his companions were stranded by a storm on the island of Sicily and were seized and confined in a cave by the giant. Polyphemus ate two of the Grecians the first day, and, after returning with

his flocks at night, devoured two others the second day. Ulysses at length contrived to intoxicate the giant with wine brought from the ship and, while in a helpless condition, he destroyed the one eye of the giant with a heated olive staff. The giant being unable to see, rolled the stone from the entrance of the cave, and, when he allowed his flock of sheep to pass out, the captives escaped in safety.

POLYTECHNIC SCHOOL (pŏl-ĭ-tĕk'nĭk), an educational institution that has courses of study in arts and sciences, and whose special object is to induce the practical application of the instruction given. The first school of this class was established by a decree of the French convention on Feb. 13, 1794, and since then many others have been founded. These schools of France are devoted to instruction in architecture, physics, chemistry, mathematics, engineering, telegraphy, and other branches. The institution in which the military officers, engineers, and other public officials of France are trained is known as the Polytechnic School. Institutions of a like character are now very numerous in Europe and America. The first established in the United States was founded at Troy, N. Y., in 1824, and is known as the Rensselaer Polytechnic Institute. In the latter part of the same year the Franklin Institute was founded at Philadelphia. The Mechanics' Institute at Cincinnati, Ohio, adopted a similar curriculum in 1848. Special institutions or special practical departments in other institutions are now quite general in Canada and the United States.

POLYTHEISM (pŏl'ĭ-thē-ĭz'm), the belief in two or more gods, being opposed to *monotheism*, which is the belief in one god. It is generally held that monotheism is the primitive or original form of worship, and that polytheism and other beliefs originated from the apostasy of those who abandoned the original faith or principles. The feeling of personal dependence and the practice of worship is natural to man, hence those who live under primitive conditions are easily induced, either by others or as a result of natural tendencies, to worship demonic forces or familiar objects that inspire awe and admiration. At first spirits are looked upon as gods, but when they cease to interest or satisfy, the worshiper deifies the sky, earth, sun, or other heavenly bodies. In the beginning of polytheism concrete forms are preferred, but later they develop into the abstract. The Tiber, the Ganges, and the Nile were worshiped before water was developed into a deity, but the latter afterward gave way to wisdom and other virtues, which were objects of worship in the polytheistic systems of the ancients. In the early stages of polytheism the demons and gods were frequently interchanged, and the believer who vainly sought good from the latter might turn to the demon for aid in seeking protection against ills and dangers. In some countries, as

in Greece and India, the gods were arranged in social groups to accommodate the several castes or satisfy under various conditions.

POMBAL (põm-bäl'), **Sebastião José de Carvalho, Marquis of**, statesman, born in Lisbon, Portugal, May 13, 1699; died in his castle of Pombal, May 5, 1782. He descended from a noble military family, studied law at Coimbra, and in 1739 became minister to London. King John V. made him ambassador to Vienna in 1745, but recalled him in 1750 to make him minister of foreign affairs. It was due to his efforts that the Inquisition was checked to a considerable extent in 1751. He improved the navy, the finances, and the police, and liberated the Indians of Brazil from slavery. He established elementary schools in Portugal, and in 1757 took effective steps against the Jesuits by requiring them to retire to their colleges. Two years later a plot against his life caused them to be banished from the kingdom. In 1777 Queen Maria I. ascended the throne, and, as she was largely under clerical influence, Pombal was deprived of office and many of his reforms were set aside.

POMEGRANATE (pũm'grăn-ăt), a class of trees of the myrtle family. They are native to Palestine and the Mediterranean region, but are cultivated extensively for their fruit in many countries. The tree is of small size, usually from twelve to twenty feet high. It has shining leaves and twiggy branches and bears large and brilliant red flowers. The fruit is about the size of an orange. It has a hard, reddish-yellow rind inclosing many large seeds, each of which is enveloped in a red pulp from which a cooling drink is made. The rind and the flowers are used as a powerful astringent. Some countries have a brisk trade in the pomegranate, especially in the warmer climates, since it is a particular favorite as a cooling and refreshing fruit during the warm seasons. Its culture is most extensive in Southern Europe, Western Asia, Northern Africa, Mexico, and the West Indies. Several species survive the winters in latitudes as far north as Pennsylvania, but the fruit does not mature.

POMERANIA (põm-ě-răn'ni-à), a maritime province of Germany, bounded on the north by the Baltic Sea, east by West Prussia, south by Brandenburg, and west by Mecklenburg. It has an area of 11,628 square miles. The soil is mostly fertile, though along the Baltic the surface is low and sandy. Fine forests are abundant and it has a number of beautiful interior lakes. The drainage is principally by the Oder, Stolpe, and Persante. Among the minerals are bituminous coal and inexhaustible deposits of peat. The fisheries are important. Vegetables, fruits, corn, wheat, rye, barley, and oats are produced in abundance. It has considerable interests in beet sugar, hay, potatoes, tobacco, live stock, and poultry.

Railroad lines penetrate all sections of Pom-

erania. It has vast commercial enterprises, particularly at Stettin, the capital of the province and one of the chief seaports of Germany. The University of Greifswald is the principal educational institution. Formerly the inhabitants were principally Goths, Slavs, and Vandals, and it was named in the 5th century from a Slavish tribe called *Pomerani*. The first mention in history is in 1140, and shortly after it became a part of the German Empire. It was annexed to Sweden in 1637, but the house of Brandenburg regained it for Germany in different portions until the last Swedish possession was ceded in 1815. Formerly it consisted of Vorpommern and Hinterpommern, but it is now divided into the three governments of Stettin, Stralsund, and Köslin. Population, 1920, 1,716,481.

POMEROY (pũm'ě-roi), **Mark Miller**, better known as Brick Pomeroy, journalist, born in Elmira, N. Y., Dec. 25, 1833; died in Brooklyn, May 30, 1896. After studying in the common schools of New York, he entered the office of the *Corning Journal* as an apprenticed printer; and later established a newspaper in Corning, N. Y. In 1857 he began the publication of the *Lacrosse Democrat*, but in 1868 founded the *Brick Pomeroy's Democrat* in New York. This periodical became known for its sensationalism and attained an immense circulation. Politically, Pomeroy supported the Greenback party in the later years of his life. He resided for some time in Colorado, where he located for his health and engaged in railroad and mine enterprises. He is the author of "Home Harmonies," "Brickdust," "Golddust," "Nonsense," and "Perpetual Money."

POMONA (põ-mõ'nà), the Roman goddess of orchards and fruit trees, who is mentioned in legends as the wife of Vertumnus. The latter long tried in vain to approach her and finally did so in the guise of an old woman. Immediately he changed into a beautiful youth and soon after wedded her. Ovid mentions her as the guardian of the boughs that bear the thriving fruit. She is represented in statuary as typifying autumn and assumes the form of a lovely maiden laden with branches of fruit trees. Some sculptors represent her holding a fold of her flowing garment filled with grapes and other fruit.

POMONA, a city of California, in Los Angeles County, 32 miles east of Los Angeles, on the Southern Pacific, the Atchison, Topeka and Santa Fé, and other railroads. The surrounding country produces cereals and fruits. The noteworthy features include the public library, the high school, and Ganesha Park. Pomona College (Congregational) is near the city, at Claremont. Among the manufactures are wine, canned fruits, earthenware, cigars, and machinery. It has public waterworks, sanitary sewerage, and well-graded streets. The place was settled in 1875 and incorporated in 1887. Population, 1900, 5,526; in 1920, 13,505.

POMPADOUR (pôn-pâ-dōōr'), **Jeanne Antoinette Poisson, Marquise de**, mistress of Louis XV., born in Paris, Dec. 29, 1721; died April 15, 1764. She was the daughter of François Poisson, an officer in the household of the Duke of Orleans, but was brought up by a rich citizen named M. de Tournhein, who exercised great care in giving her a liberal and stylish education. She not only excelled in musical accomplishments and drawing, but charmed society with her remarkable personal grace and beauty, and with the exquisite art of her dress. In 1741 she married Le Normay d'Étoiles, through whom she became a queen of fashionable society in Paris. Soon after she met Louis XV. at a ball given to the dauphin, who at once became subject to her enticing influences, and in 1745 she was established at Versailles. Louis XV. bought her the estate of Pompadour, from which she secured the title of marquise, and for twenty years the public affairs of France were largely in her hands. It had been the avowed policy of France to weaken the house of Austria by courting the friendship of Germany, but she changed this because Frederick the Great had written verses relating to her, and her course finally brought on the Seven Years' War. The loss of Canada followed, but she continued to be the controlling influence in France, and even relieved the king of many of his duties by attracting his attention to amusements and theatricals. Immense sums of money from the national treasury passed to the marquise and she obtained possession of much land and other property. However, her nervous system gave way under the exercise of social and political functions, and, when told of her approaching death, she had herself dressed in full court costume in order to meet it in the height of fashion. Though extravagant in the extreme, she encouraged poets and philosophers and patronized the "Encyclopedia."

POMPEII (pöm-pā'yě), an ancient city of Rome, located in Campania, at the foot of Mount Vesuvius. It had a beautiful site on the Bay of Naples, near which the Sarnus River has its mouth, and in the time of the latter part of the republic and the early part of the empire it was noted as a favorite retreat and residence city of the wealthy Romans. The city was founded about 600 B. C. by the Oscans and became a Roman possession about 100 B. C. Under the Romans it was made a seaport and trade center of importance. Fine villas were built by noted military men and statesmen, among them Cicero. An earthquake visited it in 63 A. D., when many of its buildings were destroyed, but the Romans at once began to rebuild on a much grander plan, and within a few years it had a population of about 25,000. The calamity that finally destroyed the city occurred in 79 A. D., when great eruptions of cinders, ashes, and melted rocks burst from Mount Vesuvius. This volcano had been inactive for

ages, but when it suddenly broke forth on Aug. 24 the accumulated force completely overwhelmed the people. For three days a continuous stream of lava flowed over the city, dense volumes of smoke obstructed the light of the sun, and the panic-stricken people were alarmed by repeated earthquake shocks that heaved and lowered the surface in consecutive waves.

Amid the fearful disturbance the citizens rushed rapidly from the city, but many were buried by the lava or suffocated in the gases that escaped from the burning mountain. Both Pompeii and Herculaneum were destroyed, but the former was buried so deeply that all attempts to restore it were abandoned by Emperor Titus, who had organized commissions to relieve the sufferers and rebuild the city. At present the mass covering the city has an average thickness of twenty feet, but a part has been thrown from the volcano by subsequent eruptions. The city was entirely lost in the Middle Ages, partly because the Sarnus River had been turned from its course and the coast regions had been raised by the disturbance so the site was more than a mile from the Bay of Naples. In 1748 the first discovery of the lost city was made by sinking a well in a vineyard of the vicinity. The workmen discovered a beautiful chamber containing statues and other productions of great beauty. Soon after extensive excavations began to be made and in 1755 the theater, amphitheater, and other buildings of historic interest were uncovered.

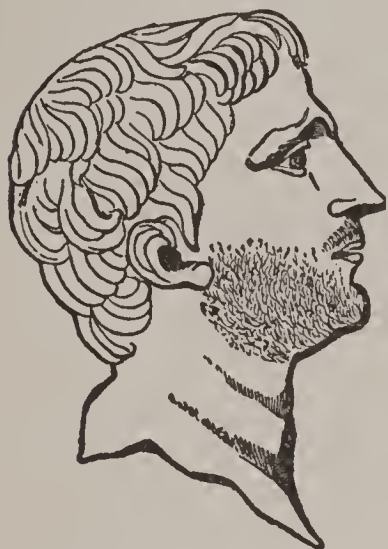
A system of excavations was promoted under the Italian government in 1760 for the purpose of restoring a large part of the statues and other valuable works of art. In the reign of Murat, from 1808 to 1815, the Street of Tombs, the Forum, several public buildings, and a number of residences were excavated. Subsequently Victor Emmanuel devoted public funds to promote excavations and secured many of the ancient works of art that may now be seen in the Italian and other European museums. These excavations show that the city was built in the form of an oval, with straight and regular streets, but some of them were not more than from fifteen to twenty feet wide, though the principal streets had a width of about thirty feet. The streets were paved with blocks of lava. The houses were largely of concrete, though bricks were used in some structures, and many were from two to three stories high. Shops and offices occupied the lower floors and the upper parts were used for dwellings. Light was provided by a hall in the center of the building, which was connected with the street by narrow passages, and all the rooms and apartments were small.

The architecture itself was not of particular interest, except as found in the public buildings, but the works of art are of much value, since they include specimens of the great masters and throw considerable light on ancient history.

Among the most notable public buildings are the Temple of Mercury, the Pantheon, or Temple of Augustus, the Temple of Jupiter, the Temple of Venus, the Amphitheater, the Basilica, and the Curia. The private villas of Sallust, Marcus Lucretius, and Cicero have been located and a number of paintings and ornaments have been secured from them. The number of skeletons found is not more than 300. They have been exhumed largely from basements, indicating that most of the citizens escaped or were destroyed by the burning lava. The city at its greatest prosperity is thought to have had from 30,000 to 50,000 inhabitants.

POMPEY, Cneius Pompeius Magnus, eminent Roman, born Sept. 29, 106 B. C.; died in Egypt, Sept. 28, 48. He was the son of Pompeius Strabo, and under his father's direction received careful training in military arts, entering the field to support Sulla in his contest against the party of Marius and Cinna at the age of seventeen years. Two years later he raised three legions to aid Sulla. By decisive movements he drove the army supporting Marius from Sicily and Africa, and shortly after joined Sulla at Rome. He was surnamed Magnus (Great), a title which he retained permanently, and, though only of the equestrian rank, he was given a great triumph in the capital. His next success was to repel the forces of Lepidus from Italy and quash the revolt raised by Sertorius in Spain and on his return to Rome, in 71 B. C., he was given a second triumph. His efficiency made him the idol of the people, and, though not of legal age and without official experience, he was made consul by the removal of his disabilities under a special act of the senate.

Pompey obtained the gratitude of the people a second time by driving the pirates from the Mediterranean Sea, in 67, and shortly after followed his victory over Tigranes, King of Armenia; Mithridates, King of Pontus; Antiochus, King of Syria; and the capture of Jerusalem and the complete subjection of the Jews. He returned to Italy after this marvelous campaign extending over four years and in 61 entered Rome, where the third triumph was given in his honor, the most magnificent ever witnessed there. It was his desire that the senate ratify his conquests and acts in Asia and parcel much of the lands to his veterans, but, when that body refused to accede to his wishes, he formed the first triumvirate with Julius Caesar and Crassus. Shortly after he married Caesar's daughter,



POMPEY THE GREAT.

Julia, and for some years the alliance was one of great political significance.

Caesar operated in Gaul with a vast army for nine years. There he attained glory by continued success, but Pompey devoted that period to directing events at Rome. The senate appointed him sole consul, and, after the death of Julia, in 54, he again joined the aristocratic party, filling the most important offices with political opponents of Caesar. It became his ambition to deprive Caesar of his command. Accordingly, the senate demanded that his army be disbanded and it declared Caesar an enemy to the republic. However, Caesar defied both Pompey and the senate and in 49 crossed the Rubicon. He became master of Italy without striking a blow, while Pompey fled to Greece. In 48 the two contending armies met on the plains of Pharsalia, where Caesar made himself the master of the Roman world by defeating Pompey in a decisive battle, while the latter fled to Egypt. He was betrayed by the ministers of Ptolemy, and while landing from a boat was treacherously assassinated by one of his former centurions. His head was embalmed and presented to Caesar on reaching Egypt, but that commander was displeased by such a sight and ordered that the assassin be executed.

POMPEY'S PILLAR, a celebrated column of red granite, standing on an eminence south of Alexandria, Egypt. It is built in the Corinthian order and may be seen about a quarter of a mile south of the walls of the city. The height is 98 feet 9 inches, the shaft comprising 72 feet of this elevation, and it measures about 29 feet in circumference. It is supposed to commemorate the conquest of Alexandria by Diocletian in 296 A. D., and the Greek inscription at the base relates that it was erected by Publius, prefect of Egypt, in honor of that noted conqueror. A splendid circus and a forum were near this monolith in ancient times.

PONCA, a tribe of Indians formerly in the territory now included in South Dakota and the northern part of Nebraska. They belonged to the Sioux family and spoke a dialect of the language used by the Osage, Kaw, and Omaha tribes. Lewis and Clark met with them near the mouth of the Niobrara in 1804, where they remained until 1877, when they were removed to the territory now included with Oklahoma. They now occupy a reservation jointly with the Otoes and Pawnees. In 1901 the portion in Oklahoma numbered 553, but a branch of the tribe is still in Nebraska.

PONCE DE LEÓN (põn'thã dã lâ-õn'), Juan, Spanish explorer and conqueror, born at San Servas, Spain, in 1460; died in Cuba in July, 1521. He was first engaged as a page at the Spanish court, and afterward served in the military forces sent against the Moors. In 1493 he accompanied Columbus on his sec-

ond expedition to America. Soon after he commanded an army that conquered Porto Rico, of which he became governor in 1510, but lost his position two years later. Though amassing great wealth, he lost his health and conceived the idea that a fountain could be found that would impart perpetual youth to all who would partake of its waters. On March 27, 1512, he discovered Florida and landed a short distance north of the present city of Saint Augustine. He returned to Spain in 1513, where he was appointed governor of the region he had discovered, and received equipments to conquer and colonize it. He landed in 1521, but was met by a hostile force of Indians, who killed a large number of his followers and drove the remainder back to their ships. Ponce de León was wounded by a poisoned arrow and soon after died from its effect.

PONCHO (pŏn'chŏ), an article of dress resembling a cloak, much worn by the Spaniards and Indians of South America. It is made of a rectangular piece of woolen or other cloth, usually from five to seven feet long and four feet wide. A hole in the middle enables the wearer to pass it over the head, and it hangs loosely before and behind, leaving the arms free. Many of the military men wear ponchos of waterproof cloth.

PONDICHERY (pŏn-dī-shĕr'rī), a city of India, capital of the French territory, 85 miles south of Madras. This tract of land has an area of 115 square miles and is surrounded by the British province of Madras. In 1906 the possession had a population of 272,113. The city is on the Coromandel coast, has steam and electric railway facilities, and is divided into two parts by a canal. Among the chief buildings are those of the government, the Hotel de Ville, and the Catholic cathedral. It is the seat of several native and French colleges and numerous Buddhist temples. Cotton textile, brick, earthenware, clothing, and machinery are the leading manufactures. It has considerable trade in sugar, rice, cotton goods, hides, and fruit. The French acquired the town and territory by purchase in 1674. It was captured by the Dutch in 1693, but four years later was restored to the French by the Treaty of Ryswick. The English took possession of it several times, but since 1815 it has remained continuously in the hands of the French. Population, 1916, 46,887.

PONTCHARTRAIN (pŏn-chār-trān'), a lake of southern Louisiana, situated immediately north of New Orleans, about five miles west of the Mississippi. The length from east to west is 40 miles and the width is 25 miles. Two canals connect it with New Orleans. It communicates through Rigolets Pass with the Mississippi Sound, thus facilitating transportation from New Orleans and the eastern part of Louisiana to the Gulf of Mexico. The lake is a favorite summer resort and many beautiful

villas occupy the high and healthful banks on its northern shore. An electric railway extends from New Orleans to the southern shore.

PONTIAC (pŏn'tī-āk), noted chief of the Ottawas, an Algonquin tribe, born about 1712; slain in 1769. He was an Ottawa Indian, but gained influence as a leader of the Pottawatamies and Ojibways, and contributed largely to Braddock's defeat in 1755. His influence led to continuous hostility with the English, and he organized a compact to exterminate the settlers. In 1766 a peace was concluded, by which Pontiac was compelled to recognize the English claims. Three years later he was killed by a Kaskaskia Indian, who was under the influence of liquor, at Cahokia, Ill., opposite Saint Louis.

PONTIAC, county seat of Livingston County, Ill., on the Vermilion River and on the Chicago and Alton and other railroads. It has manufactures of shoes, cigars, candy, and farming machinery. The features include the high school, Y. M. C. A., courthouse, city hall, public library, St. James Hospital, federal building, and reformatory for juveniles. Pop., 1920, 6,664.

PONTIAC, a city in Michigan, county seat of Oakland County, on the Clinton River, 25 miles northwest of Detroit. It is on the Grand Trunk and the Pontiac, Oxford and Northern railroads. Many picturesque lakes are in the vicinity, making the place popular for fishing and as a resort. The chief buildings include the county courthouse, the public library, the high school, the Eastern Michigan Asylum for the Insane, and the Michigan Military Academy. Among the manufactures are flour, machinery, woolen goods, wagons, lumber products, and earthenware. The surrounding country has valuable forests and yields large quantities of cereals, dairy products, and wool. Electric lighting, pavements, and waterworks are among the improvements. It was settled in 1818, when it was named from the Indian chief, Pontiac, and was incorporated in 1861. Population, 1904, 10,884; in 1920, 34,273.

PONTIFEX (pŏn'tī-fĕks), the title given by the ancient Romans to members of one of the two celebrated religious colleges, the other being known as the College of Augurs. Originally there were five pontiffs of this order of priests, the president being styled Pontifex Maximus, but the number was afterward increased to nine and still later to fifteen. The pontiffs were not charged with conducting sacrifices, nor were they obliged to worship any particular divinity, but they had general control of the official religion, and their head was the highest religious authority in the state, thus being neither subject to the people nor to the senate. Only patricians were eligible to membership in the Pontifex until 300 B. C., when the number was increased to nine under the Ogulnian law, and four of the pontiffs were selected from the plebeians. Tib. Coruncanius was the first plebeian to be selected to

the high dignity of Pontifex Maximus, being elevated to that position in 254 B. C. In 81 B. C. the number was increased to fifteen by Sulla, and Julius Caesar added himself shortly after as the sixteenth, holding the position of Pontifex Maximus. With the beginning of the empire the highest dignity was bestowed upon the emperor and the title passed in succession to the ruling sovereign. In the time of Theodosius the title became equivalent to Pope, which is now one of the designations of the head of the Roman Catholic church.

PONTIFICAL (pŏn-tĭf'ĭ-kəl), a service book of the Roman Catholic church, which contains rites and ceremonies pertaining to sacraments and public services. The pontifical now generally in use, commonly known as the "Roman Pontifical," was first published in 1485. It was revised in 1596 by authority of Clement VIII. The contents include prayers, ceremonials, and services for use in religious professions, ordinations, consecrations, benedictions, and sacraments. The "Ceremonials" is a similar service book, but is devoted particularly to ceremonials in vespers, mass, and other solemn offices. The learned Pope Benedict XIV. is the author of the most prized edition.

PONTINE MARSHES (pŏn'tĭn), a marshy region between Rome and Naples, stretching from Velletri to the sea and forming the southern part of the Roman Campagna. It is 26 miles long, varies in width from four to fifteen miles, and owes its existence to an obstruction of the streams rising in the Volscian Hills, due to elevated sand accumulating along the Mediterranean shore. Many attempts were made in ancient times to reclaim this marshy region, the first being by the consul Cornelius Cethegus in 160 B. C. Julius Caesar projected a system of complete drainage, but his untimely death caused his plans to remain unexecuted, and nothing more was done until Pope Boniface VIII. constructed a large canal and redeemed a region in the vicinity of Sezze. Other improvements were made in 1417. Pope Pius VI. began a general system of drainage in 1678 and during the succeeding ten years reclaimed a large part of the area, though much of it was given up as irreclaimable. At present the region has many excellent farms, other portions supply fine pasturage for domestic animals, and the remainder is still an extensive and unhealthy marsh.

PONTOON (pŏn-tŏon'), in military engineering, a floating vessel supporting the timbers of a military bridge. Ordinarily, a number of pontoons are connected, thus forming substantial support for a temporary bridge, which serves as a means for the safe passage of an army over otherwise impassable streams. The pontoons are boats, air-tight tin vessels, wooden frames covered with India rubber, or other devices. Bridges of this character are of vast

importance to a marching army and are usually transported by an organized train.

PONTUS (pŏn'tŭs), the name anciently applied to an extensive region in the northeastern part of Asia Minor, bordering on Armenia and Colchis in the east and extending westward to the Halys River. It included the regions north of the Anti-Taurus and Paryadres mountains, thus corresponding somewhat to the Turkish governments of Sivas and Trebizond. Pontus was governed by a Persian satrap until the conquest of Asia Minor by the Greeks. After the death of Alexander the Great, in 323 B. C., Mithridates II., a representative of an independent line of princes, came into possession of the region. He was succeeded by a number of Pontine sultans, the most powerful being Mithridates VI., who successfully resisted Roman encroachment for many years, but was finally conquered in 65 B. C. by Pompey. Shortly after Pontus was divided, but the principal part was annexed to Bithynia. Pontus developed a high degree of civilization. Its people engaged in agriculture, commerce, manufacture, and fruit raising. The principal cities were Pharnacia, Trapezus, Cabira, and Amisus.

POODLE (pŏo'd'l), the name of a small dog, distinguished by its long and curly hair. The head is high and round, the ears are long, and the legs are rather short. Large poodles are from eighteen to twenty inches at the shoulders and are favorites among sportsmen as water dogs. They have a keen smell and remarkable power to trace the lost property of their master. Most poodles have a white or tan color, but black and mixed colors are well represented. Small breeds are favorites as lap dogs. All have an affectionate disposition and are attached to their masters.

POOL, a game played on a table similar to that used in billiards, but which has pockets at each corner and midway of two sides, into which the balls may roll in playing the game. The balls are numbered consecutively from one to fifteen and are arranged in a form of a pyramid at the beginning. The first player places the cue ball beyond the string line and drives it at the numbered balls, the object being to cause them to enter the pockets. If he fails to pocket one with the first shot, the next player drives the cue ball from where it stopped, and has the right to play until he fails to pocket a ball. The games played are quite numerous and are described in elaborate rules. Usually each ball counts one, hence the winner must pocket not less than eight balls, but in some games it is customary to count the numbers. In *continuous pool* it is required that balls be pocketed in consecutive order from the lowest number; that is, as numbered from 1, 2, 3, etc. See **Billiards**.

POOLE, William Frederick, librarian and bibliographer, born in Salem, Mass., Dec. 24, 1821; died March 4, 1894. He graduated from

Yale University in 1849, and while in his junior year prepared the first edition of "Index to Periodical Literature," which he revised and enlarged from time to time. In 1851 he was chosen assistant librarian of the Boston Athenaeum and became principal librarian in 1856. He held like positions in Cincinnati and Chicago in subsequent years, serving as librarian of the Chicago Newberry Library from 1887 until the time of his death. Poole was president of several associations, including the American Historical Association and the American Library Association. He edited *The Owl* in Chicago and published "Mather Papers," "Orthographical Hobgoblin," "Battle of Dictionaries," and "Salem Witchcraft."

POONA (pōō'nā), or **Puna**, a city of British India, in the presidency of Bombay, about 120 miles southeast of the city of Bombay. It is quite well built on a desirable site and has several important railroads, but the older part of the city has crooked streets and districts quite poorly provided with sanitary conveniences. Among the chief public institutions are the Deccan College, a public library, an arsenal, several colleges, a teachers' training school, hospitals and a number of churches and temples. It has manufactures of cotton and woolen fabrics, jewelry, ornaments, silk, and utensils. Poona is the military station for a large region of India, and north of the town is a line of barracks and military hospitals. The inhabitants consist largely of Brahmans. It was formerly the capital of the Mahrattan princes, but was annexed in 1818 to the British possessions. Population, 1916, 160,108.

POORE, Benjamin Perley, author and journalist, born in Newburyport, Mass., Nov. 2, 1820; died in Washington, D. C., May 30, 1887. After attending the public schools, he became an apprenticed printer and in 1838 began editing the *Southern Whig* in Atlanta, Ga. In 1841 he visited Europe and served in an official capacity with the American legation at Brussels. On returning to America, in 1848, he was made historical agent for Massachusetts, collecting ten volumes of valuable matter from the archives in France, and in 1851 became editor of the *Sunday Sentinel*. He was appointed clerk of a senate committee in 1854 and later secretary of the United States Agricultural Society, and became editor of the *Congressional Directory* in 1867. His writings include "Campaign Life of Zachary Taylor," "The Rise and Fall of Louis Philippe," "Reminiscences of Fifty Years in the National Metropolis," "Federal and State Charters," and "The Conspiracy Trial for the Murder of Abraham Lincoln." In 1855 he compiled for the government a catalogue of publications issued by the United States from 1774 to 1881.

POOR LAWS, the legal enactments which provide for the collection and disbursement of funds for the maintenance of those lacking the

necessary means of subsistence. All the nations have made provision for supporting those who are unfortunate and without means of support, and they have regarded none so indigent or wretched as to refuse to supply them with the ordinary necessities of life, such as shelter, clothing, and food.

INSTITUTIONAL SUPPORT. Charitable institutions had their beginning in the countries of the East, where it was made a religious duty to give alms, but many of the states made provisions for supporting the poor as a matter of governmental policy. However, the support accorded indigents was at first more largely administered through religious teachers, each local organization providing for the unfortunates in its particular parish or vicinity. This plan afterward became institutional, and was fostered by the various schools and monasteries of early times and through the Middle Ages, though in most of the civilized nations it has given way to governmental support. It is still fostered as a religious institution to a greater or less extent in practically all countries. The ancient nations of Europe discouraged begging and made it a state policy to provide for the employment and support of all to such an extent that the necessities of life could be obtained without appearing in public to entreat for assistance.

ANCIENT AND MEDIAEVAL. The Grecian states generally provided for the relief of the poor, though in some of them there were no special provisions of that kind. The Romans enlarged upon the Grecian system by the encouragement of industries, and, where the people needed support or employment, committees usually provided the means. The plan of furnishing seed for crops and subsistence until a supply could be raised was one generally in favor among the Romans, but Cicero and other writers discouraged such support, except where it was actually needed, since they looked upon it as the means of creating a class of idlers who would ever after look for paternal governmental aid. With the rise of the feudal system, after the fall of Rome, the condition of the poor and laboring classes assumed a form of serfdom, when it became customary for the feudal lords to take all the products of the laborer above his actual needs. Thus this system brought on a state in which the laboring man and the poor generally were dependent upon the feudal lords for all necessities of life. During this time the church developed its functions as a supporter of the needy, and the numerous abbeys and monasteries established a system of doles for the poor similar to that of the Mohammedan countries, where alms are still distributed to the poor at the mosques.

EUROPEAN. Legislation to tax all the people for the support of the poor may be said to date in Europe from the earliest civilization, though the taxes imposed were at first of a special

character and were levied only in cases of emergency. The first general law in England dates from 1388, but this was revised in 1601 to such an extent that it may be said the British poor laws originated at that time. By the provisions then established all paying taxes were required to contribute an equitable share toward supporting the poor, and overseers were provided to personally supervise the granting of relief and the care of the needy. In some countries the workhouse system was supplied, under which all those in need of support were required to take lodging in the public workhouse, and it was made incumbent upon them to render all the services possible in consideration of their care and support. A law of this kind was in force in England until 1796, when provisions were made for granting the poor support outside workhouses, the relief usually being only a part of the means necessary, since each individual was expected to earn at least a portion of his living, but in cases where that was impossible the relief granted provided for the entire support. At present the support of the poor is a local matter in France and Germany and most other countries. Under the general laws of nearly all the states of Europe each local district is required to levy a general tax and see to it that an adequate amount is provided for all those in need.

AMERICAN. The support of the poor in the United States is left directly to the several states. As a rule the legislatures have established institutions for the maintenance of the dependent and helpless. Formerly the poorhouse was the common receptacle for all the unfortunate and indolent, from the fatherless infant to the idle beggar. At present there are adequate provisions for the defective, dependent, and indigent of all classes, and many of the institutions possess training and educational features. The system as a whole includes separate schools for the idiotic and feeble-minded, the deaf and dumb, the blind, the insane, the children of dependent parents, the incorrigible children, and those who are neglected. The poorhouses are mostly under the control of county commissioners and are supported by a general county tax. In most instances they are maintained on farms, where the labor of the inmates is utilized to some extent in the culture of cereals, fruits, vegetables, live stock, and bees, thus making it possible for those able to exercise at least a limited amount of physical energy to aid in making the institution partially self-supporting.

The support of the poor in Canada and Newfoundland is very similar to the system in general vogue in the United States. In some instances the county commissioners may provide partial support for the poor outside the poor farm. This plan is generally taken advantage of where the individual or family has means

limited below actual need, the public support granted being less in the aggregate than the cost of maintenance at the county poorhouses. Perhaps there is no line where the rules of civil service apply more effectually in the selection of officers than in the case of superintendents of poorhouses and poor farms, since in many instances the selections are made for political reasons, and not because of peculiar fitness to manage and guide the important work of such institutions.

POPAYÁN (pō-pā-yān'), a city of Colombia, capital of the state of Cauca, on the Cauca River, 225 miles southwest of Bogotá. It is surrounded by an elevated but fertile plain. It was the center of great commercial life until 1834, when an earthquake nearly destroyed it, but it has since developed considerable enterprise. Popayán is the seat of a university, contains a cathedral and a hospital, and has a number of beautiful public and private buildings. The manufactures consist chiefly of machinery and woolen goods. A commercial road extends from it to Truxillo, Peru. The place was founded by the Spaniards in 1537. Population, 1919, 11,049.

POPE, a title applied originally to any bishop of the Christian Church, but later to the patriarch of Alexandria, and now to any priest of the Greek Church and to the Bishop of Rome. This article treats particularly of the latter, who is the supreme pontiff and visible head of the Roman Catholic Church. He is regarded by that church the vicar of Christ and the successor of Saint Peter. The title was applied to all the bishops of the Roman Catholic Church in the early centuries, but a council convened at Rome in 1076, at the instance of Gregory VII., and resolved that it should be applied only to the Bishop of Rome. A long struggle ensued between the Eastern and Western churches for superiority, but the tradition that the apostle Peter founded a church in Rome and afterward suffered martyrdom there gave the Western church preëminence. It was quite natural that the bishops located at the imperial city should acquire precedence in influence and power, and that the widespread conversion to Christianity should ultimately give them large influence in temporal matters.

Emperor Valentin III. issued a decree, in 445, recognizing the Bishop of Rome as primate, but for more than 300 years papal measures met with violent opposition. The division of the Eastern and Western churches in 1054, known as the Greek and Roman churches, ended the contention between the two bodies. *Temporal power*, though previously claimed, was not fully established until in 754, when Pepin, King of the Franks, recognized such authority. In 774 Charlemagne confirmed the temporal power of the Pope and enlarged his dominion, and in 1076 Princess Matilda, daugh-

ter of Duke Boniface of Tuscany, made the Holy See heir to her extensive possessions. For many years powerful contentions between the states of the church and the rulers of Europe were common, and France, under Philip the Fair, was the first power to successfully resist papal authority. The rise of Protestantism under Luther caused the Pope to lose fully one-half of Europe and this loss was never regained. When the Thirty Years' War was ended with the Treaty of Westphalia, in 1648, religious tolerance was established or foreshadowed in all the countries of Europe, and the papal revenues not only decreased, but the bulls issued from Rome no longer had material effect outside the states of the church. Conditions were soon brought about that made the decline of temporal power rapid.

When the Franco-German War began, in 1870, Napoleon III. was obliged to withdraw the French troops from Italy. This circumstance was taken advantage of by Victor Emmanuel, King of Italy, and on Sept. 20 of that year he entered Rome and took possession of the palace for the Italian kingdom. The Pope has lived in seclusion since that time, being stripped of all temporal power, but his influence in spiritual matters has in no wise been interfered with. In 1870 the Vatican Council decreed that the Pope has supreme power in all matters of faith and discipline pertaining to the pastors and the faithful, and proclaimed that he has *infallibility* by divine assistance, when in his apostolic office he defines a doctrine of faith and morals. The Pope is addressed as *Your Holiness*, and his insignia embrace the straight corsier, the pallium, and the tiara or triple crown. He may not nominate his successor, since that power is vested in the College of Cardinals, who usually select one of their own number.

Below is a list of the popes as published in the *Roman Notizie*, the dates showing the beginning of their pontificates. The names of those who claimed the dignity of Pontiff, usually called the *anti-popes*, are in italics:

	A. D.		A. D.
St. Peter	42	St. Dionysius	259
St. Linus	66	St. Felix I.....	269
St. Anacletus.....	78	St. Eutychianus	275
St. Clement I.....	91	St. Caius	283
St. Evaristus	100	St. Marcellinus	296
St. Alexander I.....	108	St. Marcellus I.....	308
St. Sixtus I.....	119	St. Eusebius	310
St. Telesphorus	127	St. Melchiades	311
St. Hyginus	139	St. Sylvester I.....	314
St. Pius I.....	142	St. Marcus	336
St. Anicetus	157	St. Julius I.....	337
St. Soterus	168	Liberius	352
St. Eleutherius	177	St. Felix II.....	355
St. Victor I.....	193	St. Damasus I.....	366
St. Zephyrinus	202	St. Siricius.....	384
St. Calixtus I.....	217	St. Anastasius I.....	398
St. Urban I.....	223	St. Innocent I.....	402
St. Pontianus	230	St. Zosimus	417
St. Anterus	235	St. Boniface I. {	418
St. Fabian	236	<i>Eulalius</i>	
St. Cornelius	250	St. Celestine I.....	422
St. Lucius I. {	252	St. Sixtus III.....	432
<i>Novatianus</i> }		St. Leo I., the Great.	440
St. Stephen I.....	253	St. Hilary	461
St. Sixtus II.....	257	St. Simplicius	468

	A. D.		A. D.
St. Felix III.....	483	Agapetus II.....	946
St. Gelasius I.....	492	John XII...}	
St. Anastasius II.....	496	<i>Leo VIII.</i> }	956
St. Symmachus.....	498	Benedict V.....	964
St. Hormisdas }.....		John XIII.....	965
<i>Lawrence</i> ... }	514	Benedict VI.....	972
St. John I.....	523	Domnus II.....	974
St. Felix IV.....	526	Benedict VII.....	975
Boniface II. }.....		John XIV..... }	
<i>Dioscorus.</i> }	530	<i>Boniface VII.</i> }	983
John II.....	533	John XV.....	985
St. Agapetus I.....	535	Gregory V... }	
St. Sylvester.....	536	<i>John XVI.</i> }	996
Vigilius.....	537	Sylvester II.....	999
Pelagius I.....	555	John XVII... ..	1003
John III.....	560	John XVIII... ..	1003
Benedict I.....	574	Sergius IV.....	1009
Pelagius II.....	578	Benedict VIII.. }	
St. Gregory I., the		<i>Gregory VI.</i> }	1012
Great	590	John XIX.....	1024
Sabinianus.....	604	Benedict IX. {	
Boniface III.....	607	<i>John XX.</i> ... }	1033
St. Boniface IV.....	608	Gregory VI.... }	
St. Deusdetit.....	615	<i>Sylvester III.</i> }	1045
Boniface V.....	619	Clement II.....	1046
Honorius I.....	625	Damasus II.... }	
Severinus.....	640	<i>Benedict IX.</i> }	1048
John IV.....	640	St. Leo IX.....	1049
Theodorus I.....	642	Victor II.....	1055
St. Martin I.....	649	Stephen X.....	1057
St. Eugenius I.....	654	Benedict X.....	1058
St. Vitalianus.....	657	Nicholas II.....	1058
Adeotatus.....	672	Alexander II... }	
Domnus I.....	676	<i>Honorius II.</i> }	1061
St. Agatho.....	678	Gregory VII... }	
St. Leo II.....	682	<i>Clement III.</i> }	1073
St. Benedict II.....	684	Victor III.....	1086
John V.....	685	Urban II.....	1088
Conon..... }		Paschal II.....	1099
<i>Theodorus</i> }		Gelasius II..... }	
<i>Paschal</i> ... }	686	<i>Gregory VIII.</i> }	1118
St. Sergius I.....	687	Calixtus II.....	1119
John VI.....	701	Honorius II.... }	
John VII.....	705	<i>Celestine II.</i> }	1124
Sisinnius.....	708	Innocent II.... }	
Constantine.....	708	<i>Anacletus II.</i> }	1130
St. Gregory II.....	715	<i>Victor IV.</i> }	
St. Gregory III.....	731	Celestinus II.....	1143
St. Zachary.....	741	Lucius II.....	1144
Stephen II.....	752	Eugenius III.....	1145
Stephen III.....	752	Anastasius IV.....	1153
St. Paul I..... }		Adrian IV.....	1154
<i>Constantine</i> }		Alexander III.. }	
<i>Theophylactus</i> }	757	<i>Victor V.</i> }	
<i>Philip</i> }		<i>Paschal III.</i> ... }	1159
Stephen IV.....	768	<i>Calixtus III.</i> }	
Adrian I.....	772	<i>Innocent III.</i> }	
St. Leo III.....	795	Lucius III.....	1181
Stephen V.....	816	Urban III.....	1185
St. Paschal I.....	817	Gregory VIII.....	1187
Eugenius II.....	824	Clement III.....	1187
Valentinus.....	827	Celestinus III.....	1191
Gregory IV.....	827	Innocent III.....	1198
Sergius II.....	844	Honorius III.....	1216
St. Leo IV.....	847	Gregory IX.....	1227
Benedict III. }		Celestinus IV....	1241
<i>Anastasius</i> }	855	Innocent IV.....	1243
St. Nicholas I.....	858	Alexander IV.....	1254
Adrian II.....	867	Urban IV.....	1261
John VIII.....	872	Clement IV.....	1265
Martin II., or Mar-		Gregory X.....	1271
inus I.....	882	Innocent V.....	1276
Adrian III.....	884	Adrian V.....	1276
Stephen VI.....	885	John XXI.....	1276
Formosus.....	891	Nicholas III.....	1277
Boniface VI.....	896	Martin IV.....	1281
Stephen VII.....	896	Honorius IV.....	1285
Romanus.....	897	Nicholas IV.....	1288
Theodorus II. }		St. Ccelestinus V....	1294
<i>Sergius III.</i> }	898	Boniface VIII.....	1294
John IX.....	898	Benedict XI.....	1303
Benedict IV.....	900	Clement V.....	1305
Leo V.....	903	John XXII.....	1316
Christopher.....	903	Benedict XII... }	
Sergius III.....	904	<i>Nicholas V.</i> }	1334
Anastasius III.....	911	Clement VI.....	1342
Lando.....	913	Innocent VI.....	1352
John X.....	914	Urban V..... }	
Leo VI.....	928	<i>Clement VII.</i> }	1362
Stephen VIII.....	929	Gregory XI.....	1370
John XI.....	931	Urban VI.....	1378
Leo VII.....	936	Boniface IX..... }	
Stephen IX.....	939	<i>Benedict XIII.</i> }	1389
Martin III., or Mar-		Innocent VII.....	1404
inus II.....	943	Gregory XII.....	1406

	A. D.		A. D.
Alexander V.....	1409	Innocent IX.....	1591
John XXIII.....	1410	Clement VIII.....	1592
Martin V.....	1417	Leo XI.....	1605
<i>Clement VIII.</i> }		Paul V.....	1605
Eugenius IV. {.....	1431	Gregory XV.....	1621
<i>Felix V.</i> }.....		Urban VIII.....	1623
Nicholas V.....	1447	Innocent X.....	1644
Calixtus III.....	1455	Alexander VII.....	1655
Pius II.....	1458	Clement IX.....	1667
Paul II.....	1464	Clement X.....	1670
Sixtus IV.....	1471	Innocent XI.....	1676
Innocent VIII.....	1484	Alexander VIII.....	1689
Alexander VI.....	1492	Innocent XII.....	1691
Pius III.....	1503	Clement XI.....	1700
Julius II.....	1503	Innocent XIII.....	1721
Leo X.....	1513	Benedict XIII.....	1724
Adrian VI.....	1522	Clement XII.....	1730
Clement VII.....	1523	Benedict XIV.....	1740
Paul III.....	1534	Clement XIII.....	1750
Julius III.....	1550	Clement XIV.....	1769
Marcellus II.....	1555	Pius VI.....	1775
Paul IV.....	1555	Pius VII.....	1800
Pius IV.....	1559	Leo XII.....	1825
St. Pius V.....	1566	Pius VIII.....	1829
Gregory XIII.....	1572	Gregory XVI.....	1831
Sixtus V.....	1585	Pius IX.....	1846
Urban VII.....	1590	Leo XIII.....	1878
Gregory XIV.....	1590	Pius X.....	1903
		Benedict XV.....	1914
		Pius XI.....	1922

POPE, Alexander, noted poet, born in London, England, May 22, 1688; died May 30, 1744. He was the son of a Roman Catholic merchant, a man of considerable wealth, who resided in a rural home near Windsor the later part of his life. He engaged in study from an early age and at twelve years wrote his "Ode to Solitude," which is noted for many thoughtful expressions. Later he was sent to school at Twyford and London, where he became a proficient scholar in Greek and Latin. His stature was so small that he needed a high-chair at the table and his physical strength was greatly impaired, being unable to dress or undress himself much of the time. He roamed about the fields in his youth that he might regain his health, whereby he came in contact with the many scenes of nature, which enabled him to touch with powerful fancy and truth the lessons drawn from the "Iliad" and "Odyssey" of Homer. His "Essay on Criticism" was published in 1711, which placed him in high repute among the men of his time, and soon after appeared "The Rape of the Lock," a masterpiece regarded the most beautiful of his writings. In 1733 he published his "Essay on Man," a work in four epistles. The first treats of man in his relation to the universe; the second, of his relation to himself; the third, of his relation to society; and the fourth, of his ideas of happiness.

His writings conform to the laws of rhythm. He influenced remarkably the poetry of his own and succeeding generations. Many writers have strived vainly to equal him, although few have succeeded in expressing thought in the spirit of poetry with which he wrote. The most widely studied of his works were, perhaps, his translations of the "Odyssey" and the "Iliad" of Homer. They were his most profitable books, the latter yielding him \$30,000. Other writings from his pen include "The Temple of Fame," "Windsor Forest," "Dun-

ciad," "Moral Epistles," "Epistle of Eloisa to Abélard," "Elegy on an Unfortunate Lady," "Verses to the Imitator of Horace," and "On the Use of Riches."

POPE, John, soldier, born in Louisville, Ky., March 16, 1822; died Sept. 23, 1892. He graduated from the United States Military Academy in 1842 and soon after secured an appointment as lieutenant of engineers in the United States army. While holding that position he served on the survey of Florida, on the northwestern boundary, and in the Mexican War. He was promoted for efficient services at Monterey and Buena Vista to the rank of captain, and aided in making the government surveys in North Dakota and New Mexico until the beginning of the Civil War. In the early part of 1861 he became brigadier general of volunteers, and in December of the same year defeated the Confederates under General Price at Blackwater, Mo. The following spring he captured New Madrid, in the same State, and Island No. 10 in the Mississippi River. He was soon after transferred to the East, where he was given command of the army of Virginia, which had been under Generals McDowell, Frémont, and Banks. They had been defeated by Stonewall Jackson, and after a vigorous campaign Pope was defeated on Aug. 29-30, 1862, in the Second Battle of Bull Run. At his own request he was transferred to the department of the Northeast, and in 1865 to Missouri. Subsequent to the war he served in the department of the Pacific and resigned in 1886, having been made major general in 1882. The failure of Pope's campaign resulting in his defeat at Bull Run was charged to the disobedience of Fitz-John Porter, who was court-martialed and dismissed from the army in 1863, but was restored in 1886. Pope died at the soldiers' and sailors' home at Sandusky, Ohio, where he was visiting. He is the author of "Explorations from the Red River to the Rio Grande" and "The Campaign of Virginia."

POPLAR (pŏp'lēr), a genus of deciduous trees, widely distributed in the North Temperate Zone, particularly in the temperate parts of North America and Europe. About twenty species have been described, fully half of them being native to North America. Most of the species are of rapid growth, producing timber that is light and easily worked, but not particularly valuable for durable qualities. However, the wood is used extensively for fuel, while the trees are among the most highly prized for ornamental and shade purposes. The leaves are alternate and have a more or less tremulous motion, and the flowers include both barren and fertile, growing in catkins. Among the most noted species are the aspens, cottonwood, and Lombardy poplar, these three being particularly peculiar for the tremulous motion of their leaves which is due in part to the

length and slenderness of the leafstalk, but mainly to its being flattened vertically. Other well-known species include the Italian poplar,



POPLAR.

Leaves, Flower, and Catkins.

white poplar, balsam poplar, and Ontario poplar.

POPLAR BLUFF, county seat of Butler County, Mo., 72 miles west of Cairo, Ill., on the Black River and on the Missouri Pacific and other railroads. It has brick yards, foundries, and machine shops. The features include the courthouse and federal building. It was settled in 1849. Population, 1920, 8,042.

POPLIN (pŏp'lin), a fabric of French origin, first made at Avignon in the 15th century. It is a soft and elastic fabric, made by weaving a warp of silk with a weft of worsted yarn.

POPOCATEPETL (pŏ-pŏ-kā-tā'pēt'l), an active volcano of Mexico, situated 45 miles southeast of the City of Mexico, in the state of Puebla. It has an elevation of 17,784 feet above sea level. The lower slopes have fine grasses and forests, but vegetation ceases at an altitude of 13,500 feet, and the peak is covered with perpetual snow. The crater is about 900 feet deep, measures three miles in circumference, and smoke issues from it at intervals, but no eruptions have occurred since 1548. Diego Ordez first ascended the mountain in 1522.

POPPY, a genus of plants which are native chiefly to the warmer regions of Europe and the western part of Asia. They occur in many parts of Europe as weeds, but some species have been improved by propagation and are cultivated as ornamental plants and for the production of poppy oil and opium. The roots of the poppy are annual or perennial, the flowers are showy, and the capsule contains a large number of seeds. The *white poppy* is the most valuable for opium. Poppy oil is pressed from the seed of both the white and black poppy. It is useful in artistic painting and is sold as a food in the European market. Poppy oil cake is a wholesome stock food. The *carnation poppy* is a double-flowered variety and is cultivated extensively in gardens and parks. See **Opium**.

POPULATION (pŏp-ŭ-lā'shŭn), the whole number of people in a place or a given territorial area, or the state of a country with respect to the number of its inhabitants. Every form of vegetable and animal life possesses an inherent power of propagation. This power may be said to be infinite, and, if all the conditions as to climate, space, and food were favorable—that is, if not interfered with by other organic beings or natural conditions—any given form of life would rapidly multiply until every region of the earth would be filled with it. It is apparent to any one studying the subject of population that the power of increase is not limited by desire, since, if it were, the natural tendency of the species to favor a multiplication of their own kind would rapidly increase their number, perhaps, to an extent equal to twice their aggregate in each generation.

Writers generally limit the power of increase to the means of subsistence, since all life forms are interfered with when attainable means to support life are inadequate. Viewed from this



WHITE POPPY.

A, Ripe Capsule.

standpoint, it is apparent that population must actually increase beyond the means of subsistence before further increase is arrested by this limitation. Conditions of this kind have

never arisen to limit the population of the earth as a whole, but in China and other countries of Asia they have prevailed to a greater or less extent, though emigration of large numbers has afforded relief in different periods of time. The excellent work of T. R. Malthus, entitled "Essay on the Principle of Population," published in 1798, places the ratio of increase in population on a geometrical basis, and limits the increase of means of subsistence to an arithmetical ratio. The sources of this writer are historical and statistical and he draws conclusions from both in proof of the fact that human life has continually pressed upon the means of subsistence in all countries and in all climates where the populations have existed for long periods of time. Among the other checks pointed out by him are vice, misery, and moral restraint. Each of these has a more or less marked effect in preventing possible births from taking place. Taken collectively, they have a powerful influence in shortening human life.

The civilized nations of modern times secure an approximately accurate estimate of their respective populations by taking a census at regular intervals. It is usual to obtain more information than the bare fact of the number of persons in the nation. Such additional information is obtained as will supply a reasonably accurate knowledge of the age and vitality of individuals, their sex, and the relative conditions of the various industries, thus affording reliable intelligence as to the conditions under which the inhabitants may pursue their political life and thought. It cannot be said that a normal state has yet been reached in the population of Canada and the United States, since a large immigration is still coming to find homes under less crowded conditions. However, the births exceed the deaths annually; hence, there would be a perceptible increase in population even if the natural laws of migration were not operating to increase the number of inhabitants.

In Europe the number of females aggregate 1,055 to every 1,000 males, while in the United States the males exceed the females. The census of 1900 places the males at 39,059,242, or 51.2 per cent., and the females at 37,244,145, or 48.8 per cent. This difference is accounted for largely from the fact that more males emigrate from the European countries than females, thus increasing our male population more largely than the female, but the sexes are variously affected by social and industrial conditions. The general advancement of civilization has caused an increase in the duration of life by elevating the general standard of living. However, there is still great need of further development by providing more wholesome sanitary regulations, better shelter, and purer food for a large per cent. of people. It is probable that judicious management would

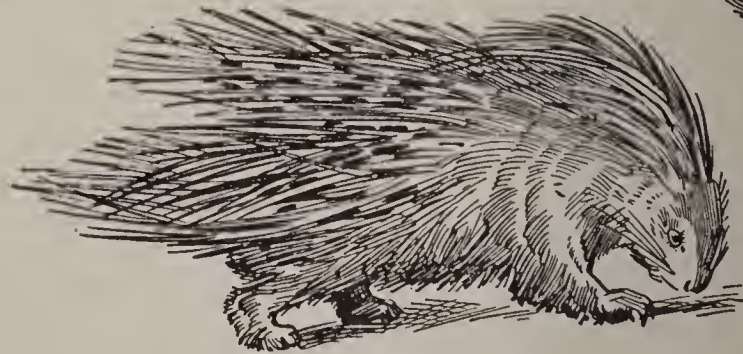
tend to largely increase the means of subsistence in many countries, especially in the cultivation of the land, and correspondingly open fields for the more wholesome support of a larger population. In Canada and the United States there is a continuous concentration of people in the cities. The urban population of the latter country, in 1920, was 43,623,383, or 47.3 per cent. of the total population. In 1790 there were but six cities having more than 8,000 inhabitants, but in 1920 there were 692.

POPULATION, Center of, the locality constituting the center of population of a state or nation. The center of population of the United States has moved westward continuously since the first census was taken, in 1790, when it was 23 miles east of Baltimore. It was 22 miles west of Baltimore in 1800; 40 miles northwest of Washington in 1810; 16 miles north of Woodstock, Va., in 1820; 19 miles southwest of Moorefield, W. Va., in 1830; 16 miles south of Clarksburg, W. Va., in 1840; 23 miles southeast of Parkersburg, W. Va., in 1850; 20 miles south of Chillicothe, Ohio, in 1860; 48 miles east of Cincinnati in 1870; eight miles southwest of Cincinnati (in Kentucky), in 1880; 20 miles east of Columbus, Ind., in 1890; six miles southeast of Columbus, Ind., in 1900; near Bloomfield, Ind., in 1910; and eight miles northeast of Spencer, Ind., in 1920.

POPULIST. See **People's Party.**

PORCELAIN (pôr'sê-lîn). See **Pottery.**

PORCUPINE (pôr'kû-pîn), a rodent quadruped. It has coarse hair thickly interspersed with erectile quill-like spines, especially on the



CANADA PORCUPINE.
CRESTED PORCUPINE.

rump and tail, which it uses as a means of defense. The genus includes a large number of species, varying greatly in size and habits. The *Canada porcupine* is native to the temperate parts of North America. The body is about two feet long and it weighs from twenty to thirty pounds. It has short quills concealed in

the fur, small ears, and a comparatively short tail. The *coendus porcupine* is common to the warmer parts of America and is remarkable for its prehensile tail, which it uses as an aid in crawling among the branches of trees. The *crested porcupine* is widely distributed in Eurasia and Africa. This species has a grizzled-black color and is about the size of the North American porcupine. The spines lie flat and concealed until the animal becomes excited, when they assume an erect position. Most species of porcupines are torpid in winter and generally solitary in habits. They live mostly on fruit, roots, and other vegetable substances, for which they search at night, but lie concealed in their burrows during the day.

PORGY (pôr'gÿ), or **Porgee**, the name of a class of carnivorous fishes common to the tropical seas, found off the shores of Europe and America. They are sometimes called *scuppaug* and under that name are sold on local markets. Several species are common to the Mediterranean, where they are caught in large numbers. The *California porgy* ranges as far north as British Columbia and is highly valued for food.

PORK, the flesh of swine, either fresh or salted. It is used as food. The pork obtained from young and properly fed animals is easily digested, and, when occasionally eaten, is highly wholesome. The heat-giving qualities of pork make it of special value in temperate and cold climates, while its property of being capable of preservation by salting and drying renders it one of the most valuable meats in the market. No other animal food may be so easily preserved, hence it is prepared in vast quantities as food for home use and for the army and navy. The Mosaic law forbade the use of swine as food, and the Jews still regard the animal unclean. Similar views are held by other peoples of the Old World and by several Christian sects in America. However, a large majority now regard pork as one of the most wholesome foods. Products derived from it enter to a very large extent into the foods of mankind.

POROSITY (pō-rōs'ĩ-tÿ), the quality or property of possessing pores, on account of which no kind of matter, whether solid or liquid, completely fills the space it occupies. Sponges, bread, and many kinds of wood are very porous. However, the pores of some bodies are as completely invisible to the eye as the smallest atom. Pores are caused by the fact that the molecules of which a body is composed are not in actual contact, but are separated by minute spaces. This may be illustrated by adding a quantity of fine salt to a bowl full of water, which may be done without the liquid running over, but care must be exercised in giving the salt time to dissolve and the bubbles of air to pass off. Water may be forced under heavy pressure through metals,

such as silver, iron, and steel. A test of this kind is applied to heavy cannon, the water being forced into the gun by hydrostatic pressure until it oozes through the thick metal and covers the outside of the gun like froth, and, after gathering in drops, it runs to the ground in small streams. Porosity enters as a property of vast importance into natural phenomena, since water sinking into the earth, sap rising in vegetables, and other essential actions in nature are partly due to it.

PORPHYRY (pôr'fĩ-rÿ), the name applied originally to a rock having a purple-colored base, with inclosed individual crystals of a feldspar. The term now applies to any fine-grained rock containing distinct crystals of any mineral or minerals, and possessing the property of taking a fine polish. Thus, any rock in which crystals of feldspar are developed individually irrespective of the mineralogical composition of the whole is said to be *porphyritic*. Rocks of this character have been used for sculptures from remote antiquity, the ancients deriving their supply from an extensive deposit in Egypt, between the Red Sea and Siout, and from several regions of Western Asia. Valuable deposits are abundant in Germany and Great Britain, the most noted being of a pale red color with modifications of green, white, and black.

PORPOISE (pôr'pÿs), a sea mammal of the dolphin family, found extensively off the coasts of North America and Europe and in the Arctic regions. A full-grown common porpoise is about five feet long. The head is rounded in front and the snout is not extended into a beak. Its external surface is hairless and shining and the color is pure white below and dark gray or black on the upper parts. Porpoises are often seen in small herds along the coasts rather than in the open seas, though they often ascend rivers in pursuit of fishes, upon which they feed. They appear to be particularly fond of mackerel, herring, and salmon, and their teeth are well adapted to catch these fishes while pursuing them in schools. Formerly they were esteemed as an article of food, and they are still eaten by the natives of the northern part of North America, but their only commercial value is derived from the oil obtained from their blubber and their skin, the latter being of value for leather and shoelaces.

PORTAGE (pōrt'āj), a city of Wisconsin, county seat of Columbia County, 35 miles north of Madison. It is on the Wisconsin River, at the terminus of the Fox River Ship Canal, and has communication by the Wisconsin Central and the Chicago, Milwaukee and Saint Paul railways. The surrounding country is fertile. A city library, the county courthouse, and several fine schools and churches are among the principal buildings. The manufactures include brick, flour, and farm machinery. Electric lighting, waterworks, and drainage are among

the public improvements. Pop., 1920, 5,582.

PORTAGE LA PRAIRIE, capital of Portage La Prairie County, Manitoba, on the Assiniboine River and on the Canadian Northern, the Grand Trunk, and other railroads. It is in a fertile farming country and has creameries, brick yards, machine shops, electric and gas plants, and railroad works. The chief buildings include the courthouse, high school, city hall, home for incurables, industrial school, and many churches. It was settled about 1820 and incorporated in 1835. Pop., 1921, 6,766.

PORT ARTHUR, a town and naval station of Manchuria, in the province of Shing-King, 275 miles southeast of Peking, China. It is strongly fortified, but was captured by the Japanese in 1894. The Treaty of Portsmouth gave Port Arthur to Japan. Population 1918, 32,602.

PORT ARTHUR, a city of Ontario, in Thunder Bay County, on Thunder Bay, an inlet from Lake Superior. It has communication by steamboats and by the Canadian Northern and the Canadian Pacific railways. In the vicinity are extensive marble quarries, sawmills, and gold and iron mines. The city owns and operates the waterworks and the electric railway, the latter extending to Fort William. It has a large trade in fish, lumber, metals, and grain. The manufactures include brick, lumber, ironware, machinery, and furniture. Population, 1901, 3,214; in 1921, 14,886.

PORT ARTHUR, a seaport of Texas, in Jefferson County, twenty miles southeast of Beaumont. It is located on Sabin Lake, an inlet from the Gulf of Mexico, and has transportation facilities by the Kansas City Southern and other railways. The Port Arthur Ship Canal, an artificial waterway between Sabin Lake and the Gulf of Mexico, permits the largest ocean vessels to enter the port, which has been greatly improved by the United States government. It has electric lighting, well graded and paved streets, and several fine schools and churches. In its vicinity are extensive oil fields, agricultural lands, and petroleum refineries. It has large shipping interests in lumber, grain, live stock, and petroleum. Population, 1908, 4,681; in 1920, 22,251.

PORT-AU-PRINCE (pōr-tō-prāns'), capital of the republic of Hayti, situated in the western part of the island of Hayti, on a bay of the same name. It has a beautiful site and is regularly platted, but has declined in importance since French occupation of the island ceased. The principal buildings are several government structures, a hospital, the mint, a lyceum, and the customhouse. It has a number of churches, several elementary schools, and a system of waterworks, but most of the public improvements made by the French are at present in a poor state of repair. The city has a considerable trade in coffee, mahogany and redwood, cocoanuts, and fruits. Population, 1916, 102,415.

PORT CHESTER (chēs'tēr), a village of

New York, in Westchester County, 25 miles northwest of New York City, on the New York, New Haven and Hartford Railroad. It is located on Long Island Sound and has regular communication by steamboats. Many New York business men reside here and it is popular as a summer residential center. It has a public library, a park, and a hospital. The manufactures include woolen goods, clothing, hardware, and carriages. Port Chester was settled about 1742 and was known as Saw Pit until 1837. It became an incorporated village in 1868. Population, 1905, 11,198; in 1920, 16,573.

PORTCULLIS (pōrt-kŭl'lis), a framework of strong bars of wood or iron. It is usually adjusted to slide vertically in grooves on either side of the portal of a fortified place, and is so constructed that it may be quickly dropped to close the entrance in case of surprise. The lower ends were formerly supplied with sharp-pointed bars, which were intended to strike any one attempting to enter. In the Middle Ages it was common to have one or more portcullises at the entrance of castles and retreats built to insure safety, and in some countries of Europe and Asia they are still in use. The weight of many is so heavy that it is necessary to provide a powerful windlass to raise them.

PORT DARWIN (dār'wĭn), a seaport of Australia, on the northern coast of Australia, in the Northern Territory of South Australia. Near it is the city of Palmerston, which has telegraph and railroad facilities. Port Darwin has a considerable trade in lumber, live stock, and fruits.

PORT ELIZABETH (ē-lĭz'ā-bēth), a seaport of South Africa, in Cape Colony, on the western shore of Algoa Bay. It is nicely located, has a number of well-paved streets, and contains several substantial government buildings and other public institutions. Among the most noteworthy structures are the Roman Catholic cathedral, the Gray Institute Schools, the high school, several colleges and hospitals, and a number of fine churches. Among the municipal facilities are pavements, a public library, telephones, electric lighting, sanitary sewerage, and public waterworks. It has a large trade in wool, feathers, skins, machinery, and utensils. Railroad and steamboat lines supply excellent commercial facilities. Population, 1921, 30,676.

PORTER (pōr'tēr), **David**, naval officer, born in Boston, Mass., Feb. 1, 1780; died in Constantinople, Turkey, March 3, 1843. He entered the navy as midshipman in 1798, became lieutenant the following year, and took part in the Tripolitan War. He was captured with the *Philadelphia*, in 1803, and remained a prisoner until the war closed. In 1812 he was appointed captain and with the *Essex* captured a number of British prizes and the man-of-war *Alert*. He started on a cruise in the Pacific with the *Essex* in 1813, where he destroyed nearly the entire British whale fisheries

and took possession of the Marquesas Islands. On March 28, 1814, the *Essex* fought a desperate battle with the *Phoebe* and *Cherub* in the harbor of Valparaiso, in which the former was completely disabled and surrendered, and Porter returned home on parole. He was naval commissioner from 1815 to 1823. The following year he fought against the West India pirates, and in 1825 was court-martialed and temporarily suspended from duty for requiring Porto Rican officers to apologize for detaining some of his men. In 1826 he resigned his commission to take charge of the navy of Mexico, but in 1829 returned to the United States and was appointed consul to Algeria. He became minister to Turkey in 1831, a position he held until his death. He published "Journal of the Cruise of the *Essex*" and "Constantinople and Its Environs."

PORTER, David Dixon, admiral, born in Chester, Pa., June 8, 1813; died in Washington, D. C., Feb. 13, 1891. He was a son of

David Porter (q. v.), entered the navy in 1829 as midshipman, and was employed on the coast survey from 1836 to 1841. In the latter year he became lieutenant and served at stations in the Mediterranean and Brazil until



DAVID DIXON PORTER.

1845, when he returned to the coast survey. He became commander of the *Powhatan* at the beginning of the Civil War, was employed for a time at Pensacola, and in 1862 bombarded forts Jackson and Saint Philip, aiding Farragut in the enterprise of taking New Orleans. In the same year he successfully passed the batteries of Vicksburg, where he operated actively in the siege and the following year captured Arkansas Post. He was promoted to rear admiral in 1863, took Grand Gulf, near Vicksburg, and coöperated with Grant in the reduction of that stronghold. In the following year he aided Banks in the Red River expedition and was transferred to the North Atlantic squadron in December of the same year, when he made two powerful assaults on Fort Fisher, which he finally captured in January, 1865, with the aid of the military forces. He was promoted to the rank of vice admiral in 1866 and was made admiral in 1870. Until 1869 he was superintendent of the Naval Academy at Annapolis, but in 1870 succeeded Farragut as admiral of the navy. He published "History of the Navy in the War of the Rebellion" and "Incidents and Anecdotes of the Civil War."

PORTER, Fitz-John, soldier, born in Portsmouth, N. H., June 13, 1822; died May 21, 1901. Commodore David Porter was his uncle. He graduated from the West Point Military Academy in 1845 and immediately entered the Mexican War, serving throughout the contest. Besides taking part in the siege of Vera Cruz and the battles of Cerro Gordo and Chapultepec, he aided in the assault upon the City of Mexico. He was wounded in the latter and soon after was made instructor at West Point. At the beginning of the Civil War he became colonel, was shortly after appointed brigadier general, and was assigned by General McClellan to a command in the Army of the Potomac. After taking part in the Peninsular campaign, in 1862, he superintended the siege of Yorktown, and was attached to General Pope's army of Virginia in his campaign against Lee and Jackson.

Porter and his corps were present at the Second Battle of Bull Run, Aug. 29-30, 1862, and in the afternoon of the first day of the battle he was ordered to attack Jackson, but this he disregarded. His conduct became the subject of a long controversy and Pope charged him with being the cause of the defeat of the Union army. His defense was that the order of attack came so late in the afternoon that he thought it advisable not to make an assault, since he regarded an overwhelming defeat inevitable on account of superior opposing forces, thus exercising only the discretion commonly vested in subordinate commanders. However, he was court-martialed and deprived of his command. For more than twenty years the justice of this sentence was a subject of general discussion. He was restored to the rank of colonel in 1886 and placed on the retired list at his own request. From 1884 to 1888 he served as police commissioner in New York.

PORTER, Horace, soldier and diplomat, born in Huntingdon, Pa., April 15, 1837. After studying a year at the Lawrence Scientific School, Harvard, he entered the West Point Military Academy and graduated from the latter in 1860. He was chief of ordnance and artillery in the siege of Fort Pulaski, Ga., in 1862, was transferred to the army of the Potomac, and after the Battle of Antietam was ordnance officer on the staff of General Rosecrans. In 1864 he was made aid to General Grant and took part in all the battles around Richmond until the surrender at Appomattox Court House. Subsequently he was made brigadier general in the regular army, serving as private secretary during the first administration of President Grant, and in 1873 accepted the presidency of the West Shore Railroad. President McKinley appointed him ambassador to France in 1897, in which position he rendered useful service. He published "West Point Life" and "Campaigning with Grant."

PORTER, Jane, novelist, born in Durham, England, in 1776; died in Bristol, May 24, 1850.

She was a sister of Sir Robert Ker Porter, studied in Edinburgh and London, and in 1803 acquired general popularity by publishing "Thaddeus of Warsaw," an interesting romance. The "Scottish Chiefs" followed seven years later. This work is an interesting production in the field of historical novels, but the theme was treated more extensively by Sir Walter Scott. Other works from her pen include "Tales Round a Winter's Hearth," "The Pastor's Fireside," and "Field of Forty Footsteps."

PORTER, Noah, educator and author, born in Farmington, Conn., Dec. 14, 1811; died at New Haven, March 4, 1892. He graduated from Yale University in 1831 and engaged in teaching school. From 1831 to 1833 he taught in the Hopkins Grammar School at New Haven, was tutor at Yale from 1833 to 1835. In 1871 he became president of the same institution, but resigned in 1885, though he continued his professorship until his death. Among his many writings are "Books and Reading," "Human Intellect," "Science of Nature Versus the Science of Man," "American Colleges and the American Public," and "Elements of Moral Science." He edited the revised editions of "Webster's Dictionary" of 1864, 1880, and 1890.

PORT HOPE, a town of Durnham County, Ont., on Lake Ontario and on the Grand Trunk and other railroads. It is situated 63 miles east of Toronto. The features include the courthouse, high school, public library, and Trinity College. It has canning works machine shops, and gas and electric plants. The place was settled in 1798. Population 1921, 4,456.

PORT HUDSON, Siege of, an attempt to capture Port Hudson, a village in Louisiana, in the Civil War of the United States. It is situated on the Mississippi, 135 miles above New Orleans, and was strongly fortified by the Confederates as a means to control navigation on the Mississippi. General Gardner commanded the garrison with about 7,500 men, while the Federal force under General Banks and Admiral Farragut numbered fully 20,000. The place was infested by the Federals on March 26, 1863, but it withstood numerous attacks until July 9, after General Grant had taken possession of Vicksburg.

PORT HURON (hū'rūn), a city in Michigan, county seat of Saint Clair County, on the Saint Clair River, sixty miles northeast of Detroit. It is on the Grand Trunk and the Père Marquette railroads and has steamboat connection with the principal ports on the Great Lakes. It has shipyards, dry docks, a customhouse, and extensive grain elevators. The noteworthy buildings include the county courthouse, the Carnegie public library, the high school, the city hall, the Maccabee Temple, the public hospital, and many fine churches. Among the manufactures are flour, carriages and wagons, tobacco and cigars, marble products, engines, iron-

ware, farming implements, machinery, and earthenware. The city is supplied with electric street railways, city waterworks, sanitary sewerage, street pavements, and other municipal facilities. It is connected by a railway tunnel under the Saint Clair River with Sarnia, in Canada, and has a large trade in lumber, produce, and merchandise. Port Huron was settled by the French in 1790, became a village in 1849, and was incorporated as a city in 1857. Population, 1904, 20,028; in 1920, 25,944.

PORT JERVIS (jēr'vīs), a village of Orange County, New York, on the Delaware River, 60 miles northwest of New York City, on the Erie and the New York, Ontario and Western railroads. It was named after John B. Jervis, an engineer of the Delaware and Hudson Canal. This canal connects the Pennsylvania coal fields with the Hudson River. Pop., 1920, 10,171.

PORTLAND, county seat of Jay County, Ind., 49 miles southeast of Fort Wayne, on the Salamanie River and on the Lake Erie and Western and other railroads. It has a courthouse, high school, and federal building. The industries include egg packing, machine shops, and tile works. The place was settled in 1836. Population, 1920, 5,958.

PORTLAND (pōrt'land), the largest city of Maine, county seat of Cumberland County, 105 miles northeast of Boston. It is located on Casco Bay, an inlet from the Atlantic, and has transportation facilities by the Grand Trunk, the Boston and Maine, and the Maine Central railroads. Intercommunication is by a network of electric railways. The harbor is sufficiently deep for the largest vessels and has communication by a number of coastwise and transatlantic steamship lines. About twenty square miles are included in the site, which is beautified by many parkings and shade trees, giving it the name of *Forest City*. The streets are regularly platted, including many that are substantially paved with stone and asphalt. Within the bay are numerous wooded islands and a number of these are popular as summer resorts. Cushing's Island contains Fort Levitt; Great Diamond Island has Fort McKinley; and Portland Head contains Fort Williams.

The public parks embrace about 225 acres. They include Lincoln, Deering Oaks, Fort Allen, and Fort Sumner parks. Monument Square has a fine soldiers' monument. Eastern Cemetery, on the southern slope of Munjoy's Hill, contains the remains of a number of persons noted in history. The public library has about 50,000 volumes. The city hall, the post office, the customhouse, the United States Marine Hospital, and the building of the Portland Society of Natural History are among the principal buildings. It is the seat of the Maine Medical School, a department of Bowdoin College, and has a number of charitable and professional institutions. The churches include the Saint Luke Cathedral (Episcopal), the First Baptist, the

Chestnut Street Methodist Episcopal, and the Cathedral of the Immaculate Conception (Roman Catholic). Among the buildings of historical interest are the houses occupied by Longfellow, Preble, and Wadsworth.

Portland is the seat of an extensive domestic and foreign trade. It has large grain elevators, stock yards, and railway machine shops. The exports consist chiefly of apples, live stock, and grain, large quantities of these products coming from many points in Canada. The manufactures include flour and grist, boots and shoes, canned fish and fruits, wagons and carriages, confectionery, monuments and stoneware, locomotives, and machinery. Marble and clay are quarried in the vicinity and the products are used extensively in manufacturing enterprises. It has a large wholesale and jobbing trade and supplies many towns and cities of New England with merchandise and manufactures.

The first settlement on the site of Portland was made in 1632, when it was known by the Indian name of Machigonne. Later the name was changed to Stogomer, then to Casco Neck, and still later to Falmouth. The Indians destroyed it completely in 1676, when a large number of its inhabitants were taken captive. It was rebuilt soon after, but was again destroyed by the Indians in 1690. The British burned it in 1775, but it was rebuilt during the Revolutionary War and incorporated as Portland in 1786. The present charter dates from 1832. Among the prominent men born in the city are Neal Dow, Henry W. Longfellow, Commodore Preble, Erastus Brooks, and Thomas B. Reed. Population, 1900, 50,145; in 1920, 69,272.

PORTLAND, the largest city in Oregon, county seat of Multnomah County, on the Willamette River, twelve miles above its junction with the Columbia and about 100 miles from the Pacific coast. It is finely located at the head of deep-water navigation, and occupies the slopes that rise gradually from the river and merge into forest-covered hills, back of which are distant mountains. The city is on both sides of the river, which is crossed by a number of substantial bridges. Railway transportation is by the Oregon Railway and Navigation Company, the Northern Pacific, the Great Northern, and the Southern Pacific railroads. An extensive system of electric railways has lines to all parts of the city and many adjacent towns, including Oregon City.

The business district is centered largely on the west side of the river, where the streets are parallel to the river, but all parts of the city are platted on a regular plan, the streets crossing each other at right angles. Many of the streets are paved with stone, brick, asphalt, and macadam, and the residential districts are finely improved with parkings and shade trees. Extensive systems of electric and gas lighting, waterworks, sewerage, and drainage are main-

tained. The principal buildings include the post office, the union railway depot, the county courthouse, the public library, the high school, the Industrial Exposition building, and the Portland Hotel. Among the large office and business edifices may be mentioned the Frank, Worcester, Meier, Dekum, Marquam, and *Oregonian* buildings. It is the seat of the Portland Academy, the Portland University, the Michael's College, and the law and medical departments of the University of Oregon. The public library has about 65,000 volumes.

Being situated at the head of ocean navigation, on the waterway formed by the Willamette and Columbia rivers, and at the converging center of numerous railroads, it has exceptionally fine commercial advantages. In its vicinity are extensive forests and mineral resources. It has a large trade in lumber, grain, flour, and merchandise, both domestic and foreign. The Willamette Falls at Oregon City, twelve miles above Portland, furnish water power sufficient to operate the street railways and many industrial enterprises. The manufactures include soap and candles, boats and ships, saddlery and harness, malt and spirituous liquors, canned fruit and fish, clothing, cigars, and machinery. It has extensive grain elevators and wholesale houses.

The city was founded in 1845 by settlers from New England, who named it after Portland, Me. In 1851 it received its charter as a city, when it had a population of only 821. Since then it has grown rapidly and at present is one of the wealthiest cities in the country. In 1904 it was the seat of the Lewis and Clark Exposition, one of the great industrial exhibitions of the United States. Portland Heights, an eminence in the western part of the city, affords a fine view of the valleys of the Willamette and the Columbia, including the snow-capped summits of Mount Ranier and Mount Hood. Population, 1920, 258,288.

PORTLAND, Isle of, a rocky peninsula of Dorsetshire, England, in the English Channel, supposed to have been an island in former times. A ridge of shingle called the Chesil Bank connects it with the mainland. The island is about five miles long and two miles wide, and is formed largely of Portland stone. About 1,500 convicts are kept on the island by the British government, in the convict prison, a massive structure on the top of a hill, and these are employed in working the stone for exportation. Most of the coast line is precipitous and there is but one landing place for vessels, this being on the north side. Several lighthouses are in the vicinity and a breakwater built of stones provides safe refuge for hundreds of the largest ships. With the harbor are connected a naval station and batteries. The southern point of the island is called the *Bill of Portland* and between it and the Shambles, three miles to the southeast, is a dangerous

surf called the *Race of Portland*. The island has excellent water and is noted for the production of sheep, which yield the famous Portland mutton. Population, 1917, 15,238.

PORTLAND CEMENT. See **Cement**.

PORTLAND VASE, a beautiful cinerary urn, which was found in the Monte del Grano, near Rome, in the 16th century. It is made of transparent, dark blue glass, has a height of ten inches, and is regarded the finest specimen of cameo cut glass preserved from ancient times. This vase was deposited in the Barberini palace at Rome until 1770, when it was purchased by Sir William Hamilton, from whose possession it passed to the Duchess of Portland. The Duke of Portland placed it in the British Museum in 1810, where it was willfully broken by a miscreant in 1845, but soon after the fragments were skillfully reunited in a complete manner.

PORT LOUIS (lō'is), the capital of the island of Mauritius, in the Indian Ocean, east of Madagascar. Port Louis is the principal seaport of the British colony of Mauritius. It is situated on the northwestern coast, where it has a fine site on a gradually sloping elevation averaging about 2,000 feet above sea level. It is a British coaling station and has a number of barracks, military stores, and hospitals. The botanical garden contains a fine collection of flowers and plants. The streets are narrow, but they are regularly platted, and are improved by pavements, avenues of trees, electric lighting, street railways, and waterworks. It has a large trade in fruits, wool, clothing, and utensils. Population, 1918, 54,583.

PORT OF SPAIN, a city on the island of Trinidad, situated near the western coast. It is connected with the interior by a railway line. The harbor is sufficiently deep only for the smaller vessels, goods being landed from the larger ships by flatboats and from a pier. The city is well platted and built. It has several substantial government houses, two cathedrals, a theater, barracks, and a number of educational institutions. The trade is quite important, especially in tropical fruits, coffee, tobacco, lumber, and cereals. Population, 1918, 60,284.

PORTO RICO (pōr'tō rē'kō), or **Puerto Rico**, an island of the West Indies, the fourth in size of the Antilles, located east of Hayti, from which it is separated from Mona Passage. It is situated about 1,200 miles north of the equator, 1,000 miles from Key West, Florida, and 100 miles southeast of New York. The length from east to west is about 100 miles, the width is 30 miles, and the area, including several small islands near the coast, is 3,606 square miles.

DESCRIPTION. The island has a shore line of 360 miles, but comparatively few indentations characterize the coast. About one-tenth of the surface is included in the coastal plain, which is usually low and has many fluvial valleys. A

range of mountains traverses the island from east to west, reaching its highest altitude at the western extremity in El Yunque, whose highest summit is 3,610 feet above sea level. In most places the highlands have the form of hills, which range from 2,000 to 3,000 feet in altitude. The slopes are principally toward the north and south from the central highlands, but the lands are cut deeply by streams.

The mountains form the watershed, hence the streams flow either south into the Caribbean Sea or north into the Atlantic. Few of the streams are useful for navigation, being short and rapid, but several flowing north have estuaries that are navigable a few miles and furnish harbors. The La Plata, the Tanama, and the Manati flow north; the Mayaguez and the Anasco flow west; the Coamo and the Guamani flow south; and the Humacao flows east. These and other streams furnish water power and a number are employed in irrigation. Several small lakes are located near the coasts.

Porto Rico has a healthful climate, due in part to its excellent drainage. Along the coast the climate is hot, but the highlands of the interior are less highly heated. In the colder part of the year the thermometer seldom falls below 50°, and in the warmer part of summer it rises to 96° and sometimes to 108°. At San Juan, on the northern coast, the mean annual temperature ranges from 78° to 82°. Rainfall is abundant, averaging 60 inches at San Juan. While the rains are not heavy, precipitation occurs almost daily, but the greater part of it takes place in autumn and summer. It is heaviest in the highlands, by which the rainfall is cut off to some extent along the southern slope, where irrigation is necessary to make farming profitable. Destructive hurricanes sometimes sweep over the island, causing much damage to life and property.

MINING. The island has deposits of iron, copper, and gold, but mining has not been developed to a large extent. Considerable gypsum is produced for making stucco and fertilizers, and granite is quarried for monuments and building purposes. Near Juana Diaz are quarries that produce a fine variety of marble. Phosphates are found along the southern coast and on Mona Island, off the western shore. Rich deposits of guano are worked near Ponce. Lignite and bituminous coal occur in paying deposits, but little has been done to develop the fuel resources. Natural evaporation produces considerable salt in the lagoons near the sea.

AGRICULTURE. Farming is the chief industry, engaging nearly 65 per cent. of the inhabitants. The soil and climate are favorable to the growth of semitropical plants, and modern farming implements have been introduced. About one-fourth of the total area is cultivated, but fully 90 per cent. is suitable for agricultural purposes. Sugar is the principal product, being obtained

from sugar cane. Coffee is grown in the region where the altitudes range between 600 and 2,000 feet and was long the leading crop, but has been exceeded since 1906 by the production of sugar. Tobacco takes third rank in the value of the product. Other crops include cotton, maize, rice, bananas, pineapples, lemons, oranges, and other tropical fruits.

Originally the island was heavily timbered with cedar, ebony, sandalwood, laurel, palms, and other useful trees, and the forest area is still extensive. However, farming and stock raising have encroached considerably upon the timbered districts. Cattle are grown for meat and dairying purposes. Other domestic animals include horses, sheep, mules, swine, and poultry. The sections which are not suitable for cultivation furnish a fine growth of nutritious grasses.

MANUFACTURES. Sugar and tobacco factories are the leading industrial establishments. Fruit canning has developed materially, but it is confined largely to the five months of the year in which the pineapples are in condition to be

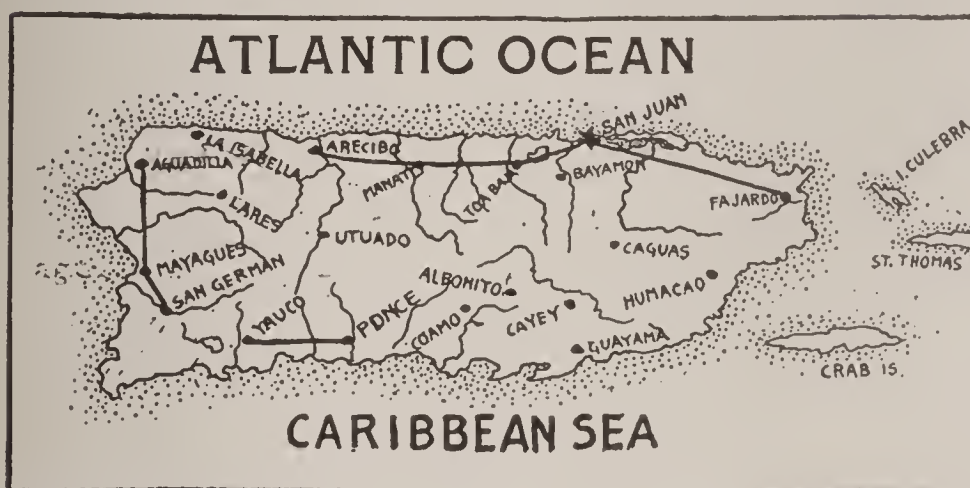
the imports. Sugar, tobacco, coffee, and fruits are the leading exports. The imports include machinery, clothing, and merchandise. Commerce is largely with the United States, Spain, and the ports of the West Indies.

GOVERNMENT. The government is territorial. In the early part of American occupation the authorities were chiefly military, but civil government was fully established in 1900. Executive power is vested in the Governor, who is appointed by the President of the United States, subject to confirmation by the Senate. He is assisted by a council of eleven members, all being appointed in the same manner, but five must be native Porto Ricans. Legislative power is vested in the Assembly, which is composed of the executive council and a house of delegates of 35 members. Members in the latter are elected for two years by a popular vote. The right of suffrage is limited to those who have an elementary education and possess a small amount of property. Judicial authority is vested in the supreme and district courts, whose judges are appointed by the President. Other officials appointed in the same way include the treasurer, the commissioner of education, and the attorney-general. A resident commissioner represents the island at Washington, but he has no seat in Congress. Under the system of government formulated for the island, it is provided that a citizen of Porto Rico is not a citizen of the United States.

EDUCATION. A system of public schools was put in operation shortly after the island became a possession of the United States. Since then the schools have almost doubled in number.

The elementary schools in operation comprise about 1,850 and about half of the teachers are natives of the island. Fully one-third of the schools are graded, and high schools with well-articulated courses are maintained in the cities and larger towns. Spanish is taught generally, but the English language has been introduced into the graded schools. A normal school for the training of teachers is situated at San Juan. Roman Catholicism is the predominant religion and the people of that faith maintain a number of parochial schools. Protestant churches are located in Ponce, San Juan, and a number of the smaller towns.

INHABITANTS. Fully three-fourths of the immigrants are Spaniards or of Spanish descent, a large per cent. coming from Spain, South America, and the West India islands. About three-fifths of the inhabitants are pure white and the remainder are partly or entirely of Negro blood. At the time the island was ceded to the United States, about 77 per cent. were unable to read and write. Roman Catholicism was the established religion and the priests were supported by taxation. The people are small in weight and stature, but they are muscular



ISLAND OF PORTO RICO.

canned. Planing mills are operated at San Juan and Mayaguez, and macaroni factories are conducted profitably. Other manufactures include rum, cotton and woolen goods, soap, clothing, embroidery, straw goods, boots and shoes, and farming implements. Earthenware and pottery are made quite extensively and considerable interests are vested in the manufacture of household utensils.

TRANSPORTATION AND COMMERCE. The larger part of transportation is by water, since no part of the island is more than twenty miles from the coast. The railways in operation have a total of 225 miles, but a line to form a circle near the shore has been projected. Electric roads are operated at Ponce and San Juan. About 650 miles of telegraph lines are in use. Two submarine cables connect the island with the outside world, one through Kingston, Jamaica, and one through Saint Thomas. Steamers ply regularly between Porto Rico and the leading ports of the United States, South America, and Europe. Commerce has increased materially since the United States took possession of the island. The exports somewhat exceed

and capable of enduring considerable work. They live chiefly in the rural districts. San Juan, situated on an island separated from Porto Rico proper by San Antonio Channel, is the capital. Other cities include Ponce, Mayaguez, Arecibo, San German, Bayamon, and Guayama. The island is divided into political divisions called *departments*, which correspond to counties in Canada or the United States. In 1920 the population was 1,258,012. The area, population, and density of population, in 1899, were as given in the table below :

DEPARTMENT.	AREA IN SQUARE MILES.	POPULA- TION.	PERSONS TO A SQUARE MILE.
Guayama.....	561	111,986	200
Humacao.....	413	88,501	214
Ponce.....	822	203,191	247
Arecibo.....	621	162,308	261
Bayamon.....	542	160,046	295
Mayaguez.....	407	127,566	313
Aguadilla.....	240	99,645	415
Porto Rico.....	3,606	953,243	264

HISTORY. Porto Rico was discovered by Columbus in 1493, when it was named San Juan Bautista. Ponce de León visited the island in 1508, when he explored a part of the coast, and two years later conquered the island. The natives, known as Caribs, were hostile for more than ten years, but the native tribes were eventually subdued and enslaved. The island remained under Spanish rule with varying success until 1898, when it was ceded to the United States as a result of the Spanish-American War. In the long period of nearly 400 years the history is not particularly eventful. The English under Drake tried to get a foothold in 1595, the Dutch under Heinrich made a similar attempt in 1615, and a second attempt was made by the English under Abercrombie in 1797. However, the Spanish continued to hold possession even through the revolutionary movements in South America. It was made a province of Spain in 1869 and slavery was abolished in 1873. San Juan was bombarded by a fleet of the United States under Admiral Sampson in 1898, while General Miles landed military forces at Ponce and other points. On Oct. 18, 1898, the American flag was raised over the island, which was ceded to the United States in December by the Treaty of Paris. Civil government was soon established under Charles H. Allen (born in 1848). Prohibition was adopted by a popular vote in 1917.

PORT SAID (pōrt sā-ēd'), a seaport of Egypt, on the Mediterranean Sea, immediately west of the Suez Canal. The site is on a narrow strip of land that is separated from the Mediterranean by Lake Menzaleh. The streets are regularly platted, intersecting each other at right angles. Some of the business blocks and private residences are substantial, but its growth is limited because of an inadequate water supply and the barren nature of the desolate strip

of land on which it is located. Port Said owes its existence to the Suez Canal. It was founded in 1859 and was so named from the patron of the enterprise, Said Pasha. It has a considerable canal and sea trade and is important as a coaling station. Population, 1917, 54,884.

PORTSMOUTH (pōrts'mūth), a city of New Hampshire, one of the county seats of Rockingham County on the Piscataqua River, 58 miles northeast of Boston, Mass. It is three miles from the Atlantic, on the Boston and Maine Railroad, and has a deep and well-fortified harbor. The city contains many buildings that date from colonial times, some of them quaint and old-fashioned, but the streets are beautified with avenues of trees and it is a favorite summer visiting resort. Across the river, at Kittery, Maine, is the United States navy yard, where such vessels as the *Ranger* and the *Kearsarge* were built. Among the conspicuous improvements are the Saint John's Church, the Portsmouth Athenaeum, the high school, the Federal post office, and Langdon, Haven, and Goodwin parks. It is the seat of several educational institutions. Portsmouth has substantial street pavements, electric street railways, and a public library of about 30,000 volumes. The manufactures include boots and shoes, machinery, shoe-buttons, spirituous liquors, and marble and granite products. It was settled in 1623 and incorporated as a town in 1653, but became a city in 1849. The Treaty of Portsmouth, which terminated the Russo-Japanese War, was concluded here in 1905. Population, 1900, 10,637; in 1920, 13,569.

PORTSMOUTH, a city in Ohio, county seat of Scioto County, at the confluence of the Scioto with the Ohio River, and at the southern terminus of the Ohio and Erie Canal. It is on the Chesapeake and Ohio, the Norfolk and Western, and the Baltimore and Ohio Southwestern railroads. The most notable buildings are a children's home, a home for destitute aged women, the Masonic Temple, the opera house, the county courthouse, the high school, and many churches. Among the manufactures are furniture, hardware, steel springs, boots and shoes, vehicles, and earthenware. The surrounding country is farming and dairying, producing cereals, fruits, and dairy products. It contains rich iron ore deposits. The place was settled in 1803 and incorporated in 1814. Population, 1900, 17,870; in 1920, 33,358.

PORTSMOUTH, a city of Virginia, county seat of Norfolk County, on the west side of Elizabeth River, opposite Norfolk. It is on the Southern, the Seaboard Air Line, the Atlantic Coast Line, and other railroads. The harbor is deep and well improved. It has a large export trade in lumber, cotton, tobacco, pig iron, and vegetables. Among the manufactures are sailing vessels, machinery, flour, lumber products, and utensils. The chief buildings include the county courthouse, the public library, the

opera house, the city hall, and many fine hotels, schools, and churches. It is the seat of the United States Gosport navy yard. Electric lighting, brick and macadam pavements, waterworks, and street railways are among the improvements. Several important railroad shops are located here. Portsmouth was settled in 1752, but was not chartered as a city until 1858. Trinity Episcopal Church, a building of historical interest, was erected in 1762. Population, 1900, 17,427; in 1920, 54,387.

PORTSMOUTH, a seaport of England, on Portsea Island, opposite the Isle of Wight, about seventy miles southwest of London. It is the principal naval station of England, has railway connections with its suburb, Portsea, and is connected with Gosport, a city opposite the entrance to Portsmouth harbor, with a fine bridge. The defenses of Portsmouth are extensive and systematically built. They include on the landward side the Hilsea lines and the Portsdown forts and to the seaward, the forts of Spithead. The harbor is only 400 yards wide at its entrance, but it gradually expands into a large and deep basin, and extends inland more than four miles, where it assumes a breadth of three miles. The manufactures are of little consequence, but it has extensive export and import trade. Coal, corn, cattle, sheep, timber, and machinery are the principal articles of commerce. Portsmouth was first established as a port by Henry VIII., but was strengthened by Elizabeth and afterward by Edward III. The city is surrounded by a large number of suburban villages and towns, all of which are supplied with municipal facilities. They have substantial school and church buildings, and a number of them rank as favorite summer resorts. Population, 1921, 231,165.

PORT TOWNSEND (tounz'end), a city of Washington, county seat of Jefferson County, 35 miles northwest of Seattle. It is situated on the west coast of Puget Sound, near the strait of Juan de Fuca, and has transportation facilities by the Northern Pacific and the Fort Townsend Southern railways. The harbor is safe and large and is protected by three forts with modern guns. Owing to its location within the influence of the Japan Current, it has a favorable and equable climate. Lumbering, farming, and fruit growing are productive enterprises in the vicinity. It has a large export trade in grain, fish, lumber, and minerals. The industries include fish and fruit canneries, machine shops, shipyards, and planing mills. The county courthouse, the city hall, the Federal customhouse, the high school, and several hospitals are among the chief buildings. The city has a public library, public waterworks, and sewerage. It was first settled in 1851 and was incorporated in 1860. Population, 1920, 2,847.

PORTUGAL (pôr'tû-gal), a country of Europe, occupying the southwestern part of the Iberian peninsula. It is bounded on the north

and east by Spain and on the south and west by the Atlantic Ocean. The length from north to south is 350 miles; the average width, 110 miles; and the area, 35,582 square miles. This includes the Azores and the Madeira islands.

DESCRIPTION. The surface is diversified by a chain of mountains that traverses from southwest to northeast. This elevated region includes the Sierra de Estrella, which is a chain of the Sierra Guadarrama of Spain. This range is between the Douro and the Tagus, and foothills and offshoots extend from it in many directions. It has a general elevation of 4,500 feet, but the most elevated summits are about 7,500 feet above sea level. The coast line, including indentations, has a length of 465 miles. A large part of the coast lands rise quite abruptly from the sea, but in some places the coastal tracts are sandy and low. A greater part of the Atlantic slope is included within Portugal, but much of it is a tableland of considerable elevation.

The drainage is exclusively to the west and south. Both the Douro and the Tagus, the two largest rivers, enter the country from Spain and flow into the Atlantic. The Tamega and Sabor are tributaries of the Douro, while the Tagus receives the inflow from the Zazere and the Zatas. The Sadão, which rises in the southern part, has a general course toward the north and flows into the Setubal Bay. A part of the eastern boundary is formed by the Guadiana, which flows into the Atlantic on the border with Spain. Few of the rivers are navigable, but seagoing vessels ascend the Douro to Oporto and the Tagus a distance of 90 miles. A part of the northern boundary is formed by the Minho, which has a wide and fertile valley.

The climate is modified by oceanic breezes on account of proximity to the sea and by the elevations in several parts, causing a diversified effect upon vegetation and the industry. In general the climate is healthful and the winters are short and mild. Vegetation is not interrupted to a great extent in the southern part, but in midsummer, in July and August, the country is generally dry. At Lisbon the mean temperature is 50° and in July it is 70°, but farther inland the extremes are much greater. Lisbon has a rainfall of 40 inches per year, but midway between that city and Oporto the precipitation is greater than in any part of Europe, averaging about 180 inches. The soil as a whole is somewhat sandy and not highly productive, but many of the valleys and plains are noted for their fertility. Snow remains the greater part of the year on the mountains of the northern part, where the summer season is shorter than farther south, although the dry part of the year is less extended. Spring begins early in January in the southern part, where vegetation grows abundantly in February, but the midsummer is quite dry.

MINING. Although rich in minerals, Portugal

has not developed mining to the extent that its resources justify. Salt is produced both for domestic consumption and exportation, and coal, lead, copper, and iron are mined. Other minerals include antimony, tin, and manganese. Slate, marble, and limestone are found in large deposits, but the output is comparatively small. Much of the mining is in the hands of foreigners, but the government is encouraging the development of the industry in a way that is interesting small investors.

AGRICULTURE. Portugal has an extensive flora. Forests of oak, mulberry, chestnut, and cork oak are abundant, and the vegetation in general is similar to that of the southern part of Europe. About sixty per cent. of the surface is fit for cultivation, but the methods of farming are crude and primitive. Vine culture is an important industry and yields a fine quality of products, thus accounting for the large manufacture and export of wine. A superior grade of cereals are produced, but the yield does not meet the demand of home consumption. Wheat, maize, rye, flax, oats, and hemp are grown profitably. The silkworm is reared with care and success in the north, where the mulberry tree thrives. Many fruits and vegetables are grown extensively.

Farming is conducted on a diversified basis. Sheep and goats are reared by a majority of the agricultural classes. Both cattle and goats are grown for meat and dairying purposes. Other live stock includes swine, horses, mules, and poultry. Oxen are used extensively as beasts of burden and draft.

MANUFACTURES. Portugal ranks as one of the leading wine-producing countries, both from the standpoint of quality and quantity. Considerable interests are vested in the fisheries, which yield many species that are canned and cured, such as the anchovy, tunny, and sardine. Cotton and woolen goods and silk textiles rank among the chief manufactures. Other products include boots and shoes, paper, leather, salt, porcelain, ironware, and machinery. Oporto and Lisbon are the principal manufacturing centers and both have extensive interests in ship-building. Repeated efforts have been made by the government to bring about a more extensive utilization of the natural resources in manufacturing enterprises, but the people have been slow in adopting modern machinery.

TRANSPORTATION AND COMMERCE. Lines of railways are operated in most sections of the country, but they are not sufficient to supply the reasonable demand. At present there are 2,350 miles of steam railroads in operation, and electric railways are operated in the larger cities and more popular sections. Wagon roads are in a reasonably good state of improvement. A limited river navigation is furnished by the rivers and canals, but the coast has numerous good harbors. Steamers sail regularly from its port to the leading port cities of the world.

The imports greatly exceed the exports. Foreign trade is chiefly with Germany, Great Britain, France, Spain, Brazil, and the United States. Coal, clothing, sugar, rice, wheat, and machinery are the leading imports. The exports include wine, coke, fish, fruits, timber, and olive oil.

GOVERNMENT. The government is based on a constitution revised in 1895. While the crown is hereditary in the male and female lines, the males of equal birthright are given preference. Chief executive authority is vested in the king, who also exercises the moderative function of the government. He is assisted by a responsible ministry, whose official sanction is necessary to legalize the acts of the crown. Legislative authority is vested in the Cortes, which consists of two branches, the house of peers and the chamber of deputies. The house of peers consists of 90 members appointed by the crown for life, the bishops and archbishops, and the princes of the royal blood who have reached the age of 25 years. In 1885 a law was passed which is operating to gradually abolish hereditary peerages. The members of the chamber of deputies are elected by popular vote, but must have attained the age of 21 years, and are required to be able to read and write or pay taxes in a certain amount upon property, though no property qualification is required of persons belonging to the learned professions. The lower house consists of 120 deputies, of whom six are chosen by the colonies, and the election is for a term of four years. A supreme court at Lisbon has ultimate judicial authority, and subordinate to it are three courts of second instance and a system of lower courts. Local government is administered within 21 districts, which are divided into communes, and these are subdivided into parishes.

The government gives encouragement to the merchant marine, which includes 75 steamers and about 500 sailing vessels. Only a few good vessels are contained in the navy, but it has 40 steamers, 15 sailing vessels, and several training ships. The standing army has a strength of 35,000 men of all ranks, while the war footing is 150,000. An army of 9,250 men and officers is maintained in the foreign colonies, in addition to the native troops.

EDUCATION. Portugal has supported a system of public instruction for many years, but its present institutions of this character are governed by the law of 1844, which makes attendance at school compulsory from the age of seven to fifteen years, provided a school is within a mile. This law is generally enforced where schools are maintained, but elementary schools are limited in number, though secondary schools are abundant and carry efficient courses of study. The higher system of education includes seventeen lycées, from which students may pass to special schools or to the University of Coimbra. This institution as a

university dates from 1300 and has an attendance of about 1,650 students. The religion is almost exclusively Roman Catholic, but Protestant places of worship are tolerated at Lisbon, Oporto and other cities. In 1834 the monasteries were closed, when their property was confiscated for the benefit of the state, although convents for nuns still exist. As a whole, the educational status is inferior to that of other European countries.

INHABITANTS. The density of population is about 152 to the square mile. About one-third of the people reside in rural districts. Only a small number of foreigners are within the country and these consist principally of Spaniards and Brazilians. Emigration is chiefly to Brazil, the United States, and the African colonies. Lisbon, on the Tagus, is the capital and the largest city. Other cities include Oporto, Braga, Setubal, Coimbra, Chaves, and Evora. Population, 1900, 5,423,132; 1918, 5,932,213.

COLONIES. The colonial possessions of Portugal have an area more than twenty times as large as the kingdom. They are situated entirely in Africa and Asia. The African possessions include Angola, the Cape Verde Islands, Guinea, Prince's and Saint Thomas's islands, and Portuguese East Africa. The colonies of Asia embrace Macao, in China; Goa, in India; Daman; and the Indian Archipelago. These possessions have an area of 817,350 square miles and a population of 9,175,800.

LANGUAGE AND LITERATURE. The Portuguese language is classed with the Romance tongues and is a modern descendant of the Latin. It is spoken in Portugal and Brazil and resembles the Spanish in some respects, but the pronunciation is somewhat similar to French. The languages spoken in Portugal and Spain up to the time of Alfonso I. were very similar, but at that time the Castilian dialect became the language of Spain and the Galician dialect quite largely influenced the language of Portugal. The difference in language was one of the causes of hostility between the two countries and each developed distinct spoken and written forms. Portuguese is more flexible than Spanish, but the latter is regarded more polite and dignified.

Many valuable literary productions have been written in the language of Portugal. The earliest writings date from the 13th century and are constituted of collections of poetry made by King Dionysius. Pedro I. was among the early poets, while the sons and grandsons of John I. produced a number of poetical works of value. Fernam Lopes (1380-1459) published "The History of Portugal" in 1425 and Antonio de Ferreira wrote "Igneis de Castro," an excellent tragedy, about 1560. In that period the Portuguese dialect was separated from other dialects spoken in the Iberian peninsula and national pride was

aroused by vast explorations in foreign lands, thus giving poets inspiration to laud Portuguese heroes and touch the spirit of nationality.

Among the great writers of the 16th century who wrote much of the classic literature of Portugal may be included Ferreira, Miranda, Brandão, Oriente, and Camoëns, the last named being the author of dramas, sonnets, songs, and a work of great value, entitled "Os Lusíadas." De Barros is the eminent historian of the 16th century and the author of "The Conquest of the Indias," while his contemporary, Brandão, wrote "The History of the Lusitanian Monarchy." The writers of the 17th and 18th centuries were influenced by French scholars, and in the time of Louis XIV. became quite imitative. Interest in literature was greatly augmented in the early part of the 19th century by the writings of Barbosa du Bocage and Manoel de Nascimento, both of whom are founders of distinct schools of poetry, the former of an affected style of sonnets and the latter of a kind of lyrics. Herculano de Carvalho is the most noted modern historian of Portugal. Other recent writers are Garrett, Ribeiro, Diniz, Silva, Castilho, and Mouzinho de Albuquerque. Brazil likewise has furnished many literary works in the Portuguese and has a large number of magazines and other periodicals. Within recent years a broader spirit and greater vigor have developed in general literature, due principally to the establishment of schools on a freer and better basis. Portuguese art is not particularly noted.

HISTORY. The earliest history of Portugal has come to us from the Phoenicians, Greeks, and Carthaginians, who traded along its coasts and established colonies in various parts of the Iberian peninsula. Its ancient name was Lusitania and the original inhabitants were known as Lusitanians. The region was conquered by the Romans and was held as a dependency for many centuries, but after the decline of Rome it was successively overrun by the Alans, Goths, and Vandals, and in the 8th century the Moors conquered it and introduced their form of civilization. For nearly 400 years the Moors remained the predominating influence, but they were finally conquered in 1139, and Alfonso I. organized an independent kingdom in 1143. The country at first included only the region between the Minho and Douro, but Alfonso enlarged the border by defeating the King of Castile, and thereby extended his dominion beyond the Tagus. In 1143 he annexed Algarve and Sanarem. Lisbon was captured by the aid of the Crusaders in 1147, an event counted among the most notable of the brilliant achievements of the reign of Alfonso.

In the period included between the latter part of the 14th and the former part of the 16th centuries Portugal ranked as one of the greatest countries of Europe. Its proud position among the nations was attained in the success-

ful reign of King John I. and that of his son, Prince Henry the Navigator. It was during this period that Portugal obtained a code of laws and a constitution, industrial arts were encouraged, and a great navy was established. Many colleges and institutions of learning were founded and all were liberally patronized. The fleet of Portugal sailed upon all the seas known at that time, Lisbon became the most noted commercial center for Eastern products, and the navigators discovered and explored many parts of Africa and the South Sea Islands. In 1487 Bartolommeo Diaz doubled the Cape of Good Hope, India was reached by Vasco da Gama in 1498, and Brazil was claimed for the crown by Cabral in 1500. The Spanish explorers were active at the same time. The jealousies that arose between the two nations caused many quarrels between the two governments, each striving to outrank the other, and in 1580 Philip II. of Spain gained the victory of Alcantara and annexed Portugal to his kingdom.

The Portuguese were greatly discontented under Spanish dominion and made strenuous efforts to regain their independence, but did not finally succeed until 1640. The Spanish government did not recognize their country as an independent nation until 1668. While Portugal and Spain were at war, the Dutch were induced by hostile measures of Philip to make continuous attacks upon the colonial possessions of both countries. During this period Portugal lost the Moluccas and its settlements in Malacca, Guinea, Ceylon, and a portion of Brazil, but the last named was afterward restored to Portugal by purchase. At that time Portugal lost its proud position as one of the great maritime powers of Europe, while its finances were almost ruined and the people sunk into ignorance and bigotry. Joseph I. succeeded to the throne in 1750 and placed the Marquis of Pombal at the head of affairs as minister. The latter sought to restore national credit and former prosperity by making many excellent reforms, but the affairs of the nation passed to the eldest daughter of Joseph, Maria Isabella, in 1777, who governed with inefficiency until in 1792, when it became necessary to make her eldest son John, Prince of Brazil, regent of the nation. The friendly relations maintained between Portugal and England caused Napoleon to desire the extinction of the reigning dynasty, and, after a French force under Junot occupied Portugal, the royal family transferred the seat of government to Rio de Janeiro, Brazil, in 1807.

John VI. ascended the throne of Portugal and Brazil on the death of Maria, in 1816, but he continued to reside in the latter country. The nation viewed with dislike the absence of the royal family, since the government at home was mismanaged by its officers. In 1820 a revolution caused the establishment of a constitution, but the king was invited to return,

which he did soon after. Brazil declared its independence from Portugal in 1822, and proclaimed the son of John VI., Dom Pedro, as emperor. King John died in 1826 and the Emperor of Brazil became Dom Pedro IV. of Portugal, but the government was administered under Infanta Isabella Maria as regent. A constitution modeled after that of France was adopted in 1826 and Dom Pedro at once abdicated the throne of Portugal in favor of his daughter, Maria da Gloria, with the condition that she should marry Dom Miguel, who was named as regent. A revolution in favor of the latter caused him to be declared king by the Cortes.

Dom Pedro resigned as Emperor of Brazil, in 1831, and returned to Europe for the purpose of overthrowing Dom Miguel, and succeeded in restoring Maria in 1833. She governed until her death in 1853, when her son, Dom Pedro V., became king under the regency of her husband, Ferdinand Saxe-Coburg. He succeeded to full government in 1855, but died in 1861, and was succeeded by his brother, Louis I. The latter died in 1889 and the sovereignty passed to his son, Carlos I., under whose reign the country experienced an era of considerable prosperity and progress. However, he and his eldest son, Luiz Philippe, were assassinated by revolutionists on Feb. 1, 1908, when his second son, Manuel II. (born Nov. 15, 1889), ascended the throne. He was deposed in 1910 and Portugal became a republic. In 1916 the country took side with the entente allies in the Great European War.

PORTUGUESE EAST AFRICA, or **Mozambique**, a colony of Portugal, on the eastern coast of Africa. It is bounded on the north by German East Africa, east by the Indian Ocean and the Strait of Mozambique, south by Natal, and west by the Transvaal, Rhodesia, and Central Africa. A part of the northeastern boundary is formed by Lake Nyassa. The area is 300,460 square miles.

The coast is low, but the country rises rapidly toward the west, where the Namuli Mountains reach an altitude of about 9,000 feet. A large part of the country is included in the Manica Plateau. The drainage is chiefly by the Rovuma, the Shire, the Zambesi, and the Oori Limpopo. Much of the country lying along the ocean is subject to malaria, but the mountainous districts are healthful. The mean annual temperature near the coast ranges from 49° to 106°, but a rainy season extends from December to March. Iron, coal, gold, and building stone constitute the principal minerals. Corn, rice, beans, wheat, tobacco, coffee, indigo, sugar cane, and fruits are grown profitably. Domestic animals, especially cattle and horses, are reared in large numbers.

The region included in the colony was occupied by the Portuguese in 1498, when Vasco da Gama landed at the mouth of the Zambesi. Military posts were established in several lo-

calities in the 16th century. Slavery was maintained until 1878, when it was abolished. The boundaries were fixed between the colony and the possessions of Germany and Great Britain in 1890. The government is administered by a royal commissioner, who has his seat at Lourenço Marques, which is the capital. Other towns include Gaza, Beira, Sofala, and Mozambique. Several highways and about 500 miles of railroad have been constructed. The trade is largely with Portugal. Population, - 1916, 2,975,000.

PORTUGUESE GUINEA, a colonial possession of Portugal, on the western coast of Africa, bounded on the north by Senegal, east and south by French Guinea, and west by the Atlantic Ocean. A number of small islands off the coast, including the Bissagos, belong to it. The entire area is 14,270 square miles. From the coasts the land rises gradually toward the mountains of French Guinea and the drainage is chiefly by the Rio Grande, which enters the sea by a wide estuary. It has a tropical climate and valuable timber, including many species of the palm tree. Rice, millet, fruits, ivory, nuts, and India rubber are the principal products. The trade is chiefly with Portugal, France, and Germany. The colony has been a possession of Portugal since 1792, but its boundaries were not established until 1886. Bulama is the capital. The inhabitants consist of many native races, mostly pagans and Mohammedans. Population, 1918, 803,100.

PORTUGUESE WEST AFRICA. See Angola.

PORT WINE, a product from grapes. It was made originally in the valley of the Douro, Portugal, and was so named from Oporto, whence it is exported in large quantities. Port wine has a color varying from pink to red, is slightly astringent, and requires about three years to mature. The annual production in Portugal is estimated at 115,000 pipes and about one-third of this is exported. Several artificial grades are made in Brazil and elsewhere.

POSEIDON (pō-sī'dōn), the god of the sea mentioned in Greek legends. He is regarded the son of Kronos and Rhea, and the brother of Zeus and Pluto. His power was surpassed only by Zeus and he presided particularly over the Mediterranean, and, like the element over which he presided, he had a very variable disposition, sometimes calm and placid and at other times violently agitated. It is due to this characteristic that he is represented by some poets as composed, while others describe him as disturbed and angry. The fisherman's fork or trident was the symbol of his power. By means of it he produced earthquakes, raised up islands from the bottom of the sea, and caused wells to spring forth from the bottom of the earth. He was the constant friend of the Greeks in the Trojan War, but, after its termination, thwarted Ulysses on his return

home for having killed Polyphemus, an heir of the god. Poseidon was worshiped with much devotion in the maritime towns, and the Isthmian games were dedicated to him. In modern Greece Saint Nicholas holds the place of Poseidon as patron of the sailors. See **Neptune**.

POSEN (pō'zēn), a province of Poland, bounded on the north by West Prussia, east by Russian Poland, south by Silesia, and west by Brandenburg. It has an area of 11,184 square miles. The surface is an undulating



POSEIDON.

plain of great fertility, and the principal drainage is by the Warthe and the Netze. The Vistula forms a part of its northeastern boundary. About twenty per cent. of the surface is covered with forests and sixty per cent. is under cultivation. The principal crops are wheat, rye, hops, potatoes, flax, tobacco, and fruits. Stock raising, dairying, manufacturing, and silk culture are the principal industries. The region included in Posen belonged to Poland until 1772, when it became a part of Prussia and Austria, though a portion of it was not incorporated with Prussia until 1793. Posen formed a part of the duchy of Warsaw from 1807 to 1815, but in the latter year it was again annexed to Prussia as the grand-duchy of Posen. The Polish part of the inhabitants took sides against Prussia in the Revolution of 1848. It is now divided into the governments of Posen and Bromberg. Posen is the capital and largest city. Population, 1905, 1,986,637; in 1920, 2,100,044.

POSEN, a city in Poland, capital of the province of Posen, on the Warthe River, 145 miles east of Berlin. It is conveniently situated, has strong fortifications, and is a noted railroad and manufacturing center. Among the principal buildings are the Marienkirche, the townhall, the royal palace, the public library, the

Evangelical gymnasium, the public theater, the central railway station, and many educational institutions. It has a fine public park and two monuments of Polish kings. The manufactures include leather, cotton and woolen goods, silk textiles, tobacco products, carriages and wagons, sugar, musical and scientific instruments, and machinery. Electric lighting, street railways, sanitary sewerage, and pavements of stone and asphalt are among the public utilities. Posen was a member of the Hanseatic League in the Middle Ages and long had importance as a trading center between Western Europe and the regions on the boundary of Asia. It was the residence of the monarchs of Poland until the end of the 13th century. The fortifications were built in 1828, and its modern prosperity dates from the building of railroads. Population, 1905, 136,808; in 1920, 156,696.

POST OFFICE, the branch of the civil service of a government which is charged with carrying and delivering the mails. It is certain that systems for conveying intelligence among individuals and between individuals and officials were maintained in times of remote antiquity, but the first systematic institution having charge of dispatches was established by the Roman Empire, though the business transacted was wholly of a public character. The places at intervals along the roads of Rome, where couriers were stationed to bear dispatches, gave rise to the word *posts*, a term now generally applied in different relations by the several nations in connection with their postal systems. The Hanseatic League of European cities established the first extensive system of carrying letters and parcels in the 13th century.

A business house of Boston, in 1639, organized the first postal service in America by arranging to care for letters and periodicals to be sent to or received from foreign countries. The New York colony established a postal line in 1672 between New York and Boston, and the stage carrying the mail made a round trip each month, but in 1702 the round trips were changed to twice a month. King William and Queen Mary granted a patent to Thomas Neale, in 1692, whereby he was made Postmaster General for the colonies. In the same year a general post office was established in Virginia, and the next year one was founded at Philadelphia. Parliament established a uniform postal system for all the colonies in 1710, and the principal office in America was located at New York, but there were general post offices to receive and distribute mails for different points in other large cities. Benjamin Franklin was the first Postmaster General to make the system a success, receiving his appointment in 1753, but he was deprived of his office in 1774 for his attitude in the American conflict.

In 1775 Congress adopted a plan for a colonial system, which had been devised by William

Goddard, and made Franklin the Postmaster General. Both the Articles of Confederation and the Constitution vested the power over postal affairs in Congress, and that body came in full control of the mails under the new Federal government in 1789. At that time only about 75 post offices were maintained in the thirteen states, but the business was continued with little substantial change until 1840, when the plan to make the post office system only expense-paying originated. Among the notable events in connection with the postal service of the United States are a postal treaty with England in 1846, improvements in postage stamps in 1847, the introduction of stamped envelopes in 1852, the establishment of the registered letter system in 1855, the introduction of free delivery in 1863, the establishment of the money order system in 1864, the introduction of postal cards in 1873, the establishment of a special delivery system in 1885, the introduction of the two-cent reply postal card in 1892, and the revision of the postal money orders in 1900. Postal notes were first issued in 1883, but the law of 1900 made them payable at any post office having the right of issue.

The growth and importance of the post office system of the United States may be noted from the following table:

YEAR.	NO. POST OFFICES.	REVENUE.	EXPENDITURES.
1790	75	\$ 37,935	\$ 32,140
1800	903	280,804	213,994
1810	2,300	552,366	495,969
1820	4,500	1,111,927	1,160,926
1830	8,450	1,850,583	1,932,708
1840	13,468	4,543,522	4,718,236
1850	18,417	5,552,971	5,212,953
1860	28,498	8,518,067	19,170,610
1870	38,492	19,772,221	23,998,837
1880	42,989	33,315,479	36,542,804
1890	62,401	60,858,783	66,645,083
1900	76,691	102,354,579	107,740,267
1920	52,993	437,150,212	454,322,609

It is the policy of the government to make the postal system practically self-supporting, but the expenditures have exceeded the receipts much of the time. In 1908 the deficit was \$16,910,278.99. This is due in a large extent to improvements effected in the service, such as rapid transit of the mails, free distribution to a large per cent. of the people, and encouragement given to educational arts by reducing or remitting entirely the postage on certain classes of periodicals. A large volume of mail is conveyed without the payment of postage, such as the official communications of postal officers and members of Congress. Besides, the United States postal service is the most extensive of any country in the world, providing for each 1,003 persons an established post office.

The rate of postage on letters depended upon distance in the early period of postal regulations, varying from eight to twenty-five cents per letter, but in 1816 the rates were graded at from six and one-quarter to twenty-five cents.

In 1846 the rates were reduced to three cents for distances not exceeding 300 miles, and ten cents was charged when the distance was over 300 miles. The rate on prepaid mail was fixed at three cents for all distances under 3,000 miles in 1851, but, if not prepaid, five cents was collected on delivery. Congress passed a law in 1856 making the prepayment of postage compulsory, and a uniform rate of three cents for each half ounce or fraction thereof was established for all distances in 1863. The rate was reduced to two cents for each ounce or fraction thereof in 1885, and only one cent was established as the rate for drop letters, except in localities having free delivery, where the rate for drop letters remained at two cents. As a war measure, in 1917, letter postage was raised to three cents per ounce and postal card rates to two cents each. Domestic rates apply to the territorial possessions.

All mailable matter is divided into four classes. *First-class* mail includes all letters and parcels sealed against inspection. Periodicals issued at regular intervals not less than four times a year comprise *second-class* mail matter, and the rate of postage is one cent a pound. In 1901 the Postmaster General promulgated a rule that excludes books published under the guise of serial publications from the mails as second-class matter. Circulars, proof sheets, books, transient newspapers, and all printed matter not issued periodically are included with *third-class* mail matter, and the rate of postage is one cent for each two ounces, though each separate parcel is limited so as to not exceed four pounds in weight. Mail matter of the *fourth-class* includes articles of merchandise and all matters not included in the other three classes. The rate of postage for fourth-class mail matter is one cent per ounce and the weight is limited to four pounds. All postage must be prepaid, except that only two cents need necessarily be prepaid on each article of the first class, and all matter may be registered by paying the postage in full and eight cents in addition. Any mail matter failing of delivery, except circulars, advertisements, and other printed articles of no apparent value, is returned to the sender. The return is made direct to the sender if the matter bears upon the outside the name and address, otherwise it is sent to the Dead-Letter Office, in Washington, where it is opened after thirty days and sent to the proper party. Many of the letters and parcels contain money or negotiable paper of value. However, they are all restored to the owner. This is also true of parcels containing merchandise. If the owner cannot be found, they are sold at auction. Auctions of parcels of merchandise unclaimed are held after the parcels remain unclaimed for two years.

There are five general methods of transporting the mails. They consist of transportation by railways, steamboats, ocean steamers,

mail messengers, and the star service. Congress is authorized to make contracts for carrying mails, which is done through the postal officials. The *star route service* is utilized in sections of the country where the mails cannot be carried by railroads or water navigation, when they are transported by carriage or stage, on horseback, or afoot. In 1874 the International Postal Convention in session in Berne, Switzerland, concluded terms whereby the Universal Postal Union was organized, which went into operation on July 1, 1875. Practically all the nations have now joined the union, thus establishing uniform rates of international postage. The rates on letters are five cents a half ounce if prepaid, and double that rate if not prepaid. Postal cards are sent to foreign countries at two cents each. One cent for each two ounces is the rate for printed matter and merchandise if prepaid, otherwise double that rate.

The special delivery authorized by Congress in 1885 provides for messengers who deliver mail matter immediately after it is received at the post office. This system extends to all post offices and in the larger cities permanent messengers are constantly on duty, but in other offices the postmaster effects delivery by any means available. The amount charged in addition to regular postage is ten cents, and the profit to the government accruing from this system aggregates about \$35,000 annually. Free delivery was first authorized by an act of Congress in 1863, and under this system carriers are employed by the government to deliver letters and other mail matter at the home or place of business indicated by the address. These carriers collect the mail matter to be sent from boxes, where it is deposited by the senders. Originally free delivery systems were established only in cities having a population of 10,000, or a gross annual revenue of \$10,000, but now many rural districts have been included, and the mails are carried by special messengers to many of the farm homes. A general system of free delivery is maintained in cities and most rural districts. The parcel post, long popular in Canada, was established in 1913.

The post office system is under the direction of the Postmaster General, who is a member of the President's Cabinet. Four classes of post offices are specified. The post offices having gross receipts of \$1,000 or more are divided into the first, second, and third classes, and those having less than that amount constitute the fourth class. Four assistant postmasters-general are appointed by the President, but all other officers and employees of the department are named by the Postmaster General. The salaries paid to postmasters filling presidential post offices range from \$1,000 to \$6,000 annually, being graded according to the volume of business, while fourth-class postmasters are paid in proportion to the amount of stamps canceled. Any attempt to interfere with the

mails, or the commission of offenses relating to the post office business, such as embezzling, robbing, or destroying any mail matter, is punishable by the government with much severity.

CANADA. The post office department of Canada is under the direction of the Postmaster General, who receives a salary of \$7,000 per year. Letters are forwarded at the uniform rate of two cents per ounce, which must be partially prepaid, else the letters are sent to the dead letter office. Postal cards are one cent each to any place in Canada, Mexico, and the United States. The rate on book post is one cent for two ounces, and the weight is limited to five pounds. Newspapers and periodicals are transmitted at one-fourth of a cent per pound, but single copies require one-half a cent each. General merchandise and all other articles not specially classified are regarded as mail matter of the *fourth-class* and require prepayment of postage at the rate of one cent per ounce or fraction thereof. All classes of mail are registered at five cents per parcel or letter in addition to the regular postage. Letters addressed to any post office in the Dominion may be insured for amounts not exceeding \$25.00 at a fee of from three to six cents. Money may be sent by postal notes, postal money orders, or registered letters. Deposits of \$1.00 or any multiple of \$1.00 are received at the postal savings banks, which are maintained at most of the branches, and deposits receive interest at the rate of three per cent. In 1915 a war tax of one cent was added to the rate on postal cards and letters.

POTASH (pŏt'ăsh), or **Potassia**, an alkaline product formed by the metallic base of potassium and other elements. A common form of potash is obtained from the lye of vegetable ashes. The product is so named from the pots and the ashes used in preparing it. It may be obtained by placing a quantity of wood ashes in a barrel, through which water is filtered, and the liquid is then boiled down to concentrate the strength. In a crude form potash is an impure carbonate of potassium and in a pure form is known as *pearl ash*. Formerly it was obtained exclusively from wood ashes, but potash minerals are used for that purpose at present. It is employed in making glass, soap, and various products used in medicines and the arts.

POTASSIUM (pŏ-tăs'sī-ŭm), a metallic element of a bluish-white color, discovered by Sir Humphry Davy in 1807. It is brittle and crystalline at 32° Fahr. and may be easily cut with a knife at 58°. At 145° it becomes a perfect liquid. The specific gravity is .875; thus, it is one of the lightest of all the metals. When thrown upon water, the metal decomposes with much rapidity, forming hydrates of potassium, while the escaping hydrogen takes fire and burns with a rose-red color. Metallic potassium

is prepared by decomposing potassium carbonate by carbon at a white heat. It is sold in the trade in round brownish masses, and, since exposure causes a film of oxide to form at the surface, it must be preserved under a liquid free from oxygen; naphtha and rock oil are generally used for that purpose. Potassium is a conductor of electricity. Chloride of potassium is a preparation sold in the market as muriate of potash and resembles common salt, being obtained from the brine of mineral springs, sea water, and the ashes of marine plants. Other preparations of potassium salts include bromide, iodide, nitrate of saltpeter, sulphide, fluoride, phosphide, chlorate, sulphate, cyanide, phosphate, and ferrocyanide. Saltpeter, bromide, and iodide are used in the medical practice, while the other preparations are employed in mechanic arts and as artificial manures.

POTATO (pŏ-tă'tŏ), one of the most valuable food-producing plants. It is cultivated extensively in all the subtropical and temperate



COMMON POTATO.

countries. The potato is native to the Andean region of South America, where it was cultivated by the Incas long before the discovery of America, and was first brought to Europe from Peru by the Spaniards. Its culture spread rapidly in Italy, Spain, the Netherlands, and Germany before the middle of the 16th century, and was first introduced into England by Sir John Hawkins in 1563. By

the close of the 18th century its culture and use had spread over most of Europe and in many countries of Asia. It is now a staple article of food among all classes, but particularly of the poorer people of Europe.

The potato belongs to the same family as the nightshade, tobacco, and henbane. It is an annual plant with large, herbaceous stems, growing from one to three feet in height. The leaves are pinnate and the flowers are of a whitish, bluish, violet, or variegated color. Some species bear a globular fruit somewhat larger than a gooseberry, which contains a number of small seeds. The tubers are the valuable part of the plant and grow underground on slender leafless shoots or branches that differ in character from the true roots. They are different in form, size, color, quality, and time of ripening, and their size has been greatly increased by cultivation. The value of the tuber depends upon the starch and other matters stored in it. These are usually about twenty per cent. of starch, five per cent. of woody matter, four per cent. of sugar, gum, albumen, casein, gluten, and kindred substances, and about seventy-one per cent. of water. Each potato has a number of eyes, or leaf buds, and propagation is effected usually by planting pieces of the tubers, each piece containing one or more eyes.

Early species of potatoes mature in about three months, but the tubers may be utilized for food under favorable conditions in about six weeks after planting. Some kinds require longer time, but this depends somewhat upon the soil and climate. The yield is from 25 to 300 bushels per acre. Germany exceeds all the countries in the production of potatoes, yielding 1,782,759,000 bushels in 1915. A large part of Canada is peculiarly fitted for potato culture, but Ontario has the largest yield, where the crop, in 1915, was 61,645,380 bushels. The potato crop of the United States averages annually about 360,500,000 bushels, valued at \$126,500,000. The states producing the largest annual yield usually rank as follows: New York, Michigan, Wisconsin, Pennsylvania, Minnesota, Illinois, Iowa, Nebraska, Ohio, Missouri, Indiana, Kansas, and Maine. Besides supplying a large quantity of food for man and animals, potatoes enter into the manufacture of starch, spirits, and sugar products. More than 500 species have been described. Those cultivated most extensively include the Early Rose, Early Ohio, Peerless, Burbank, White Star, Beauty of Hebron, and Peach Blow.

POTATO, Sweet, a climbing perennial plant cultivated extensively for its tuberous root, which is a wholesome and favorite article of food. The leaves are either cordate or lobed and are borne on slender, twining stems. The roots are large, with somewhat pointed ends, and of a reddish or yellowish color, and grow in clusters at a small depth below the

surface. Sweet potatoes are propagated by setting the tubers out in the spring, and the rows are ridged in midsummer to facilitate the development of the tuber-roots. It is not certain where the nativity of the sweet potato really is, but it is regarded of tropical origin. Its culture is comparatively modern, but it was cultivated earlier than the common potato, or *Irish potato*, as a food plant. The difficulty experienced in preserving tubers over winter in cold climates has largely limited its culture, but it is more and more entering the trade as a favorite article of food. It is grown in North America as far north as the southern part of Canada. The yield is best in a rich, sandy loam. The yam somewhat resembles the sweet potato.

POTATO FLY, an insect allied to the cabbage fly, beet fly, and turnip fly. Maggots of the potato fly are often found in rotten or damaged potatoes in autumn. In a mature state the fly is very similar to the house fly. The male has a grayish-black color and the female is of an ashy-slate color. They differ also in that the former has five broad stripes on the back and four spots on the second and third segments, while the latter has spots on the second abdominal segment. See **Colorado Beetle**.

POTOMAC (pō-to'mak), a river of the Middle Atlantic States, which rises by two branches in the Allegheny Mountains, in West Virginia, and after a course of about 400 miles enters Chesapeake Bay by an estuary. It forms the boundary between West Virginia and Maryland and between Virginia and Maryland. The course to Cumberland, Md., is in a northeasterly direction, thence it flows in a tortuous direction toward the east and northeast, but soon makes a bold turn toward the southeast, passing Harper's Ferry, Washington, and Alexandria. The estuary is 100 miles long and about eight miles wide at its entrance into Chesapeake Bay. Tide water reaches Washington, a distance of 125 miles from its mouth, and it is navigable for a large part of its course. Above Washington are several falls and rapids, which obstruct navigation.

POTOSÍ (pō-tō-sē'), a city of Bolivia, on the slope of Cerro de Potosí, about fifty miles southwest of Sucre. The mountain has an elevation of 15,200 feet, and the city is situated on a sloping plain fully 13,250 feet above sea level. It was founded in 1545 in the midst of a productive gold and silver mining region and in 1611 had a population of 165,000. Among the features are several churches and schools, a government mint, and a monument in honor of Bolivar. Within recent years the mines have failed rapidly, chiefly because of a marked decrease in the value of silver, and much of the former city is desolate and in ruins. The surrounding country is unproductive aside from its extensive mineral deposits and grazing lands. Trade is carried on exclusively by stage and

highway transports. Mount Cerro de Potosí is covered with snow perpetually, thus greatly modifying the climate, but there is an abundance of water for mining purposes. The productive mines of Potosí yielded in their greatest prosperity silver products valued at \$1,500,000 annually. Population, 1916, 23,450.

POTPOURRI (pō-pōō-rē'), a term derived from the French, variously applied to indicate a medley or hotchpotch. It is the name of a mixture of dried, sweet-smelling flower petals used to perfume a room, which is placed in a vase covered with a perforated lid. The flowers used chiefly are violets, roses, and jasmines, but they are mixed with lavender, cloves, sandalwood, and musk. The term is used also to signify a kind of incense made of mixed gums and seeds, to describe a medley of musical airs, and to signify a literary production of parts brought together without a bond of connection. A mixture of meats and vegetables, such as a stew or potpie, is sometimes called potpourri.

POTSDAM (pōts'dām), a city of Germany, capital of the province of Brandenburg, sixteen miles southwest of Berlin. It is the second royal residence of the kingdom of Prussia. It is finely situated on the Havel River and is connected with Berlin by electric car lines and railways. In the vicinity are a number of beautiful lakes and ranges of hills covered with forest trees. The surrounding country has a fertile soil, producing cereals, fruits, and tobacco. Among the noted buildings are the royal palace, a gymnasium, and numerous churches. The Church of Garrison has a tower 400 feet high, and under its pulpit are the remains of Frederick William I. and Frederick II. It has a number of beautiful public gardens and boulevards, a public library, and several historical statues and monuments. Potsdam was the favorite residence of Frederick the Great and the birthplace of Alexander von Humboldt. The manufactures include cotton, silk, and woolen goods, machinery, tobacco products, wax cloth, chocolate, scientific instruments, and porcelain. Potsdam was a fishing village until 1660, when Frederick William I. made it a royal residence and built its magnificent palace. Population, 1905, 61,414; in 1920, 62,224.

POTSTONE (pōt'stōn), an impure variety of soapstone, composed of a mixture of mica, talc, and chlorite. Though soft when quarried, it becomes hardened by exposure to air, and is used to some extent in making household utensils. In ancient times it was used chiefly for that purpose and its utility appears to have been widely known, since it is mentioned by Pliny and other ancient writers. Extensive deposits are found in Greenland, Austria, the Scandinavian peninsula, and Upper Egypt.

POTT, August Friedrich, philologist, born in Nettelrede, in Hanover, Germany, Nov. 14, 1802; died in Halle, July 5, 1887. He graduated at Göttingen and soon after became professor

of languages in the University of Halle. Pott ranks next to Bopp, Humboldt, and Grimm as a writer on comparative philology. His works display a remarkable knowledge of the Aryan languages and those of several races native to America, Africa, and Asia. His best known writings include "Gypsies in Europe and Asia," "Researches in the Etymology of the Indo-Germanic Languages," "Philological Differences of Races," and "Proper Names."

POTTAWATTAMIES (pōt-tā-wōt'ā-mīz), an Indian tribe of North America, belonging to the western branch of the Algonquin family. It early occupied the region now included in Lower Michigan and upper Indiana and Illinois. The French established missions among these Indians at Green Bay, but they afterward joined Pontiac. They were hostile to the Americans during the Revolution, but concluded a peace treaty in 1795. In 1812 they again aided the English, but in 1815 ceded nearly all their territory, when many were assigned land in Missouri and Kansas. At present the tribe numbers about 1,750, of whom 575 are in Kansas, 100 in Michigan, 300 in Wisconsin, and 775 at the Sac and Fox agency in Oklahoma. Many members of this tribe are advanced in educational and industrial arts and are successful in cultivating the soil.

POTTER (pōt'tēr), **Alonzo**, clergyman, born in La Grange, N. Y., July 6, 1800; died in San Francisco, July 4, 1865. After graduating from Union College in 1818, he began his theological studies and in 1821 became professor of philosophy and mathematics in Union College. Soon after he was admitted to the ministry of the Protestant Episcopal Church, and in 1826 became rector of Saint Paul's Church in Boston. He was recalled to a professorship in Union College in 1832, became its vice president in 1838, and was practically the head of the college until 1845, when he was chosen bishop of the diocese of Pennsylvania. Potter was a man of rare executive ability and managed the affairs of the bishopric with marked efficiency. He opposed slavery by his pen and voice. His writings include "Religious Philosophy," "Political Economy," "Handbook for Readers and Students," and "Discourses."

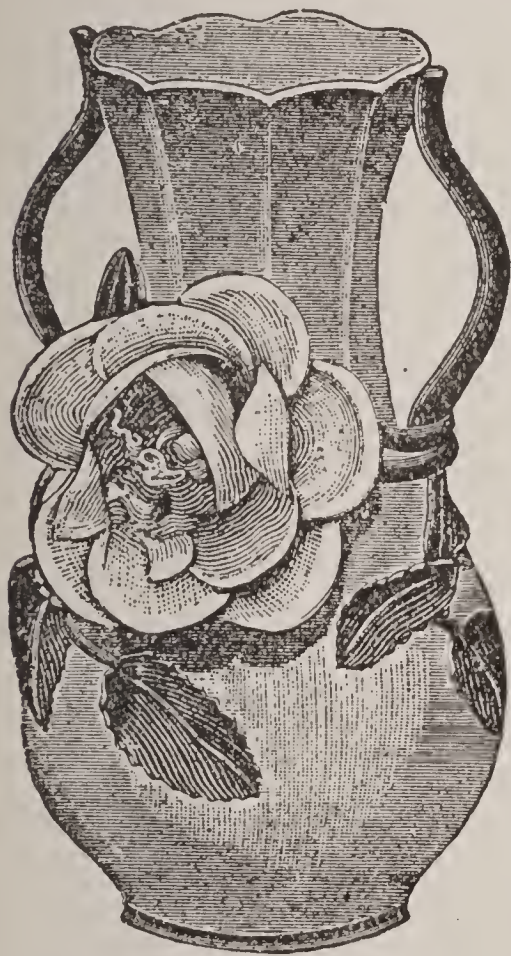
POTTER, Henry Codman, clergyman, born in Schenectady, N. Y., May 25, 1835; died July 21, 1908. He completed the course of study at Union College in his native town by graduation, and studies at the Theological Seminary of Alexandria, Va. He was first made rector of a church in Pennsylvania, but after efficient service was appointed to the rectory of Saint John's Church, Troy, N. Y., and later to the Boston Trinity Church. From 1868 until 1883 he was rector of Grace Church, New York, but in the latter year was made assistant bishop of New York, and four years later became bishop. Among his writings are "Gates of the East," "Sisterhoods and Deaconesses," "Dis-

courses," "Waymarks," and "Sermons of the City."

POTTER, Paul, noted painter, born at Enkhuysen, Holland, in 1625; died in Amsterdam, Jan. 15, 1654. His father, Pieter Potter, was a landscape painter and under his direction he received early training in Amsterdam. He executed a number of famous paintings before he attained the age of fifteen years and in 1650 settled at The Hague. In 1652 he returned to Amsterdam under an engagement of the burgo-master, who retained him to execute many important paintings. Constant work at the easel injuriously affected him and he died at the early age of 29 years. The genre paintings of Potter are more highly valued than like pictures of any other of the great masters. His "Dairy Farm," a most excellent work, 19 inches wide and 48 inches long, sold in 1890 at London for \$30,450. Other famous paintings are "Shepherd" and "Herdsman."

POTTERY (pŏt'tēr-y), the art of manufacturing earthenware or porcelain by modeling any kind of clay when in a plastic condition and then hardening by fire. This art is generally called the *ceramic art*, or *ceramics*, especially when it relates to making vessels and utensils.

HISTORICAL. This art was practiced from remote antiquity, the remains and monuments of many races giving it a standing among the industries pursued in prehistoric times. Both glazed brick and tiles have been found among the



PORCELAIN VASE.

ruins of ancient Nineveh, and on the monuments of Thebes are views of potters at work, showing that earthenware entered prominently into household and public service many centuries before the Christian era. The Mosaic writings make mention of earthenware. In the Metropolitan Museum of Art, in New York, are fine specimens of pottery, including jars, vases, cups, lamps, and household utensils, brought by General di Cesnola from Cyprus, where they were made by the ancient Phoenicians. It is thought that the Greeks learned the art of making pottery from the Egyptians and the Phoenicians, and that the Romans learned it from the Greeks. Extensive potteries were maintained at Athens,

Samos, and Corinth, where most of the pottery of Grecian manufacture was made. The product from these potteries was of splendid design and ornamentation, specimens extant possessing remarkable perfection. Many of the vases now made are patterned from the finest Grecian products.

The art was carried to Spain by the Arabs, who have credit for introducing the manufacture of glazed ware into Western Europe. Although the art of making this grade of ceramics was long thought to be of relatively modern origin, excavations in the ruins of Babylon in the last century disproved this view, since many glazed products were found there, including glazed coffins, vases, and household utensils. The celebrated *majolica wares* were first made by the Arabs in the island of Majorca, and in the 15th century the art was introduced at Florence and other Italian cities. The French learned it of the Italians, though some essentials of the art were held as secrets until Bernard Palissy, a French potter, discovered the important features involved in making majolica, and subsequently added many valuable improvements by way of ornamenting with pictures of sea animals, landscapes, and views from nature.

Artistic pottery was introduced into Germany, Gaul, and Britain by the Romans, who made products from native clays, but rude wares had been made in these regions for centuries before. The Dutch developed a peculiar kind of pottery, known as *delft*, from its extensive manufacture at Delft, Holland. Delft wares are more solid and less beautiful than those produced by Eastern methods, but they became noted for their remarkable strength. This art was introduced by the Dutch into England, where large quantities were made for several centuries. Josiah Wedgwood, an English potter, discovered methods for making more ornamental designs about the middle of the 18th century, and may be regarded among the most celebrated manufacturers of modern times. The manufacture of pottery on a large scale in the United States is of comparatively recent date and at present a comparatively large per cent. of the wares sold in the American market are of foreign manufacture. However, there is a constant growth in the annual output, which represents a total value of about \$38,500,000. Extensive potteries are located at Trenton, N. J., East Liverpool, Ohio, Cincinnati, Baltimore, Boston, New York, and Wheeling, W. Va.

PORCELAIN. The manufacture of porcelain has been an important industry among the Chinese and Japanese from a period antedating the Christian era. They were making the finest grade of porcelain while the Greeks were still using terra-cotta vases, and their skill in the finer ceramic art dates fully 2,000 years earlier than that of the Europeans. King-te-chin in the province of Giang-si was for centuries the center of vast potteries, and it is known that ex-

cellent grades of porcelain were made there in the 6th century A. D. Many thousand porcelain furnaces were in use in that city in the 18th century, but the Tai-ping insurrection destroyed practically all the works. The varieties of Chinese porcelain are endless in form and decoration and comprise some of the most delicate and beautiful known. Many specimens of the



MAJOLICA JAR.

blue ware made before the Middle Ages possessed much value, from which the Delft manufacturers first copied their blue-colored delft ware.

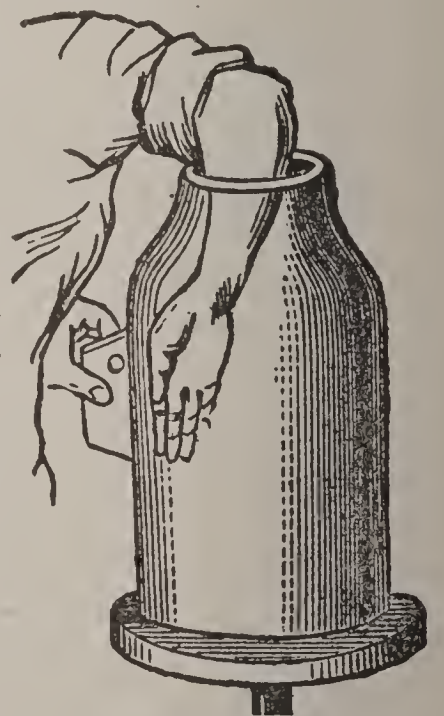
The clay used in making porcelain is called *kaolin* and was thought to be found only in China, but in 1711 Friedrich Böttger discovered large deposits of it near Dresden, Germany. He learned the secret of making porcelain while employed by the Elector of Saxony and a factory was established at Meissen, near Dresden, where the well-known Dresden porcelain is still made. A workman carried the secret to Vienna in 1720, which became a noted center of porcelain manufacture, and these two cities are still among the most extensive producers of these products in Europe. The principal porcelain manufactory in France is at Sèvres and the most noted of England is in Staffordshire. Kaolin deposits are abundant in North America, notably in New Brunswick, Delaware, Pennsylvania, New Jersey, Missouri, the Carolinas, Ohio, Illinois, and Maine.

MANUFACTURE. Many kinds of pottery are made, but all varieties are produced by molding the clay while in a moist condition into the forms desired, after which they are baked in an open fire. The molded forms are ornamented with patterns stamped into the clay before firing, but some of the grades are plain. Manufacturers mix various matters with the clays to make finer and more delicate pottery, or decorate it by paintings. Pottery is said to be *soft* when its surface is unglazed and easily scratched by a piece of iron and *hard*, when the iron has no effect on it. A common flowerpot

belongs to the soft earthenware and a Sèvres plate to the hard variety. Between these two grades are many kinds of wares. Pottery is generally divided into earthenware, stoneware, and china or porcelain. *Earthenware* is soft and includes many varieties of products, but principally *unglazed ware*, as brick, terra cotta, and flowerpots; *lustrous ware*, or products baked and coated with a slight vitreous glaze, as the ancient Greek vases; *glazed ware*, embracing ordinary clay ware with a lead glaze, as common household ware; and *enameled wares*, including ordinary clay ware with an opaque glaze, as Italian majolica or Dutch delft. *Stoneware* is a kind of pottery characterized by hardness and infusibility, properties due to the silica in the clay forming the body. The two principal varieties are a kind which is generally colored or dark and usually coated with a salt glaze, as a stoneware crock; and a kind which is light in color and coated with a vitreous glaze containing lead, as granite ware.

Porcelain is the finest and most valuable grade of pottery and is characterized chiefly by hardness. It is almost infusible, is somewhat translucent, and usually has an alkaline glaze. It is made of a body of clay containing silica, usually called *kaolin*. The principal classes include the *hard porcelain*, made of a body of kaolin and feldspar, as the porcelain known as Chinese, Berlin, and Sèvres; the *soft porcelain*, made of kaolin and calcium phosphate coated with a lead and boric acid glaze, as Worcester porcelain; and *artificial porcelain*, a kind resembling glass and made chiefly of alkaline salt and coated with a lead glaze, as the porcelain formerly made at Sèvres, France.

METHODS. Pottery is made by the workman molding and turning the plastic clay on his wheel, a kind of turning lathe, and it is then taken to a room and partially dried under a high temperature. After drying to what is called the *green state*, the product is again placed on the lathe for the purpose of giving it a truer shape and smoothness. However, this depends largely on the form of the articles, since the more complicated circular form must be pressed into molds of plaster of Paris and the work is done almost exclusively by hand. Practically the only machinery used in making pottery are the machine for mixing clay and the turning wheel of the workman. It is probable that machine labor can never be introduced to any consid-



MAKING POTTERY.

erable extent, since it is practically impossible to substitute any mechanical device for the molding hand of the potter. The articles are ready for the kiln as soon as they are properly shaped and dried, and they are exposed to a high temperature about forty hours. It is necessary for the kiln to cool very slowly, since rapid cooling causes the articles to warp or crack. They are glazed by immersing in a vitrified composition and subjecting to heat a second time. Decorations are put on in various ways, in some cases by press printing and in others by hand. Paintings are put on earthenware by a brush, usually over the glaze.

POTTSTOWN (pöts'toun), a borough of Pennsylvania, in Montgomery County, on the Schuylkill River, 38 miles northwest of Philadelphia, on the Pennsylvania and the Philadelphia and Reading railroads. The place is surrounded by an agricultural and mining district and is the center of large manufacturing enterprises. The noteworthy buildings include the high school, the public library, the general hospital, and many fine churches. Among the manufactures are dairy products, brass fittings, ironware, steel bridges, nails, iron plate, and farming implements. Fully twenty creameries are operated in the vicinity. It was platted in 1752, when it was named Pottsgrove, but it was incorporated under its present name in 1815. Population, 1900, 13,696; in 1920, 17,431.

POTTSVILLE (pöts'vil), a borough in Pennsylvania, county seat of Schuylkill County, on the Schuylkill River, 35 miles northwest of Reading. It is on the Central of New Jersey, the Pennsylvania, the Philadelphia and Reading, and other railroads. The surrounding country is a mining region that yields annually about 6,000,000 tons of coal. The principal buildings include the county courthouse, the Pottsville Athenaeum, the Commercial Union School, the public library, a children's home, and a general hospital. It has electric street railways, public waterworks, and many paved streets. It was settled in 1800 and platted by John Pitt in 1818. Ten years later, in 1828, it was incorporated. Among the manufactories are rolling mills, machine shops, stove foundries, potteries, nail and spike mills, planing mills, cigar and shirt factories, and silk and woolen mills. Population, 1900, 15,710; in 1920, 21,785.

POUGHKEEPSIE (pō-kīp'sī), a city of New York, county seat of Dutchess County, on the Hudson River, 72 miles north of New York City. It is on the New Haven and Hartford, the New York Central, and other railroads. The site rises to a height of 200 feet above the river, which is crossed by a famous cantilever bridge. A ferry crosses the river and communicates with the West Shore Railroad. An extensive system of electric railways furnishes communication to adjoining and distant towns. It has a large commercial trade and many industries. The principal manufactures

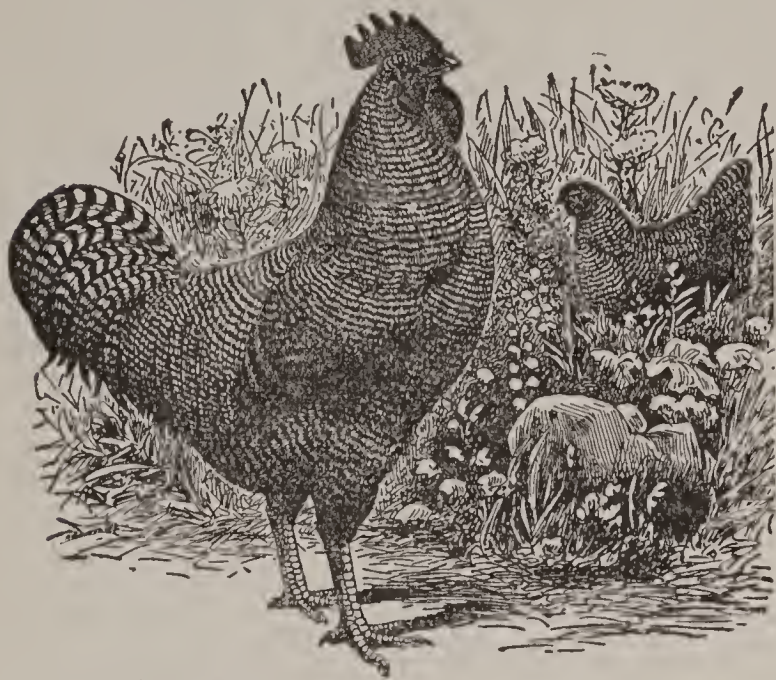
include silk and cotton goods, boots and shoes, carriages, dyestuffs, farming implements, ironware, clothing, and machinery.

The State Hospital for the Insane is situated two miles north of the city. A short distance east is Vassar College, one of the finest women's colleges in the world. Other educational institutions include the Riverview Military Academy, the Poughkeepsie Military Academy, the Lyndon Hall, the Quincy School, and the Eastman National Business College. It has a fine county courthouse, the Saint Barnabas Hospital, the Adriance Library, and College Hill Park. The place was settled by the Dutch in 1698, became the capital of New York in 1778, and was incorporated in 1799. It was so named from Apokeepsing, an Indian village, the term meaning *safe harbor*. Population, 1905, 25,379; in 1920, 35,000.

POULTRY (pōl'trī), the term applied generally or collectively to domestic fowls. They are reared for their flesh, eggs, or feathers, as chickens, geese, turkeys, ducks, guineas, and pigeons. The common chickens are the most important of the domesticated birds, since both their flesh and eggs are wholesome and favorite food. Such naturalists as Darwin ascribed the origin of the domesticated breeds to the Bankiva fowl, but the species have been increased materially by propagation. We learn from history and ancient paintings that poultry culture is of great antiquity, both civilized and savage peoples engaging more or less successfully in rearing different classes of birds. By far the largest amount of poultry reared is bred by farmers and others who make its culture a profitable adjunct to other enterprises, but in some localities special poultry farms are maintained. In many parts of France and Germany poultry keeping is the leading pursuit of the peasant, and in many places extensive yards may be seen for the confinement of chickens, while in others herders are employed to watch over vast flocks of geese and ducks. The total annual production of poultry in the United States has a value of \$550,000,000 and the production of eggs, \$250,000,000; about 56,000,000 eggs are consumed daily. The eggs of chickens comprise the most important poultry product sold in the market, but the eggs of geese, ducks, and guineas are marketed to a limited extent. As a rule, chickens and turkeys are reared for their flesh and eggs; geese and ducks, for their flesh and feathers; pigeons, for their flesh; and guineas, for their flesh and eggs, or for ornament in the barnyard.

In propagating poultry it is necessary to take into account the objects desired, especially in chickens, since the species best adapted for flesh are as a rule inclined to lay only a limited number of eggs, while the prolific layers are rather of under size. For mixed farming it is usually desirable that the size be

medium, thus combining both flesh and egg-producing qualities. The different kinds of poultry require a somewhat varied treatment, but all retain a higher state of health when allowed to run in spacious yards where they



PLYMOUTH ROCK CHICKENS.

may feed on certain forms of insects and vegetation. It is necessary to provide clean and well-ventilated houses, sufficiently warm in the winter time, and provided with ample sunlight. Soft food is beneficial to laying hens, such as moistened meal, and it is quite necessary to supply a quantity of lime food and gravel, the former entering into the composition of the eggshell and the latter as a digestive agency. Among the most wholesome foods are corn, wheat, rye, and those prepared from these cereals by grinding and soaking.

Chickens are very industrious in searching for food in the soil by scratching, while geese and ducks spend much time in bathing and searching for food at the bottom of shallow water. The eggs of chickens require three weeks for incubation, while those of turkeys, geese, and ducks require four weeks, and usually all eggs hatched are placed under sitting hens. Within recent years machines have been constructed for artificial incubation, the warmth necessary being provided by lamps or by an electric current. Many advantages result from the use of incubators, particularly the benefits derived from the ability to secure broods at any season of the year, and to obtain any number of young at a brood.

POUND, a unit of weight, which is used as a standard in several countries for the measurement of any commodity bought and sold by weight. However, the denominations differ somewhat. The pound *troy* is equal to twelve and the pound *avoirdupois*, to sixteen ounces. The pound *troy* has 5,760 grains, the standard being obtained by weighing a cubic inch of distilled water at 62° Fahr., the barometer being thirty inches, which then weighs 252.458 grains *troy*. The *avoirdupois* pound is equal to 7,000

troy grains; hence the *troy* pound is to the *avoirdupois* as 144 to 175.

The pound is of English origin and was derived from the weight of 7,680 grains of wheat taken from the middle of the ears and well dried, hence *grains* form the lowest fractional part of a pound. This continued to be the standard pound from William the Conqueror to Henry VIII., but in the reign of the latter the *avoirdupois* pound of 7,000 grains came into use. Since the time of Elizabeth it has been the standard in England, whence it was brought to America and is now used in Canada and the United States. The principal English coin of account is called *pound*, or *pound sterling*, and corresponds to the coin of circulation known as *sovereign*, which has a value of about \$4.86. It is divided into twenty *shillings*, or 240 *pence*, and weighs 123.27+ *troy* grains. The name was derived from the fact that one pound of silver was formerly coined into 240 silver pence, but now forty pounds of gold are coined into 1,869 *sovereigns*. The sign of the pound is £.

POUSSIN (pōō-săn'), Nicolas, painter, born at Villers, France, in 1594; died Nov. 19, 1665. He went to Paris in 1602 to study painting. Later he studied at Rome, where he developed a distinct style of historical and landscape painting. For some time he traveled and painted in France and Spain, but suffered poverty a number of years, and subsequently was invited to Rome by Cardinal Barberini, who gave him many orders for pictures. While in Rome he painted "The Capture of Jerusalem" and "The Death of Germanicus." This patronage brought him good fortune and he returned to Paris, where he was favored by Louis XIII. More than 200 of his pictures have been engraved.

POWDER. See **Gunpowder.**

POWDERLY (pou'dēr-lī), Terence Vincent, labor organizer, born in Carbondale, Pa., Jan. 22, 1849. He became a switchman on the Delaware and Hudson Railroad at the age of twelve and engaged as a laborer in the machine shops at Scranton when nineteen. He was elected as a labor candidate to the office of mayor of that city in 1877 and was reelected in 1878. In 1879 he became general master workman of the Knights of Labor, a position he held until 1893, when he was succeeded by James R. Sovereign. President McKinley appointed him commissioner-general of immigration in 1897. Powderly is the author of several treatises on the labor question and contributed extensively to the *Arena* and the *North American Review*.

POWELL (pou'ēl), John Wesley, geologist, born in Mount Morris, N. Y., March 24, 1834; died Sept. 23, 1902. He studied at Oberlin College and entered the Federal service at the beginning of the Civil War. For valued service he was promoted to the rank of lieutenant-colonel

and at the Battle of Shiloh lost his right arm. In 1865 he became professor of geology in the Iowa Wesleyan University and later in the Illinois Normal University, at Bloomington, Ill. He was engaged by the Smithsonian Institution, in 1867, to conduct geographical and geological surveys in the Rocky Mountain region and later explored the Grand Cañon of the Colorado River. Soon after he became director of the Bureau of Ethnology, which was established by the government, and in 1881 succeeded Clarence King as director of the United States survey. He resigned the latter position in 1894 owing to delicate health, but retained the directorship of the Bureau of Ethnology. Degrees were granted him by the University of Heidelberg, Germany, and by Harvard. His writings include "Report on the Arid Region of the United States," "Exploration of the Colorado River," "Contributions to North American Ethnology," and "Introduction to the Study of Indian Languages."

POWER (pou'ēr), in mathematics, the product obtained by multiplying a factor by itself one or more times. Thus, the second power of 2 is $2 \times 2 = 4$; the third power, $2 \times 2 \times 2 = 8$. The former is the square and the latter is the cube of 2. The degree of the power, or the number of times the given quantity is taken as a factor, is expressed by a number called the *exponent*, which is written above and at the right of the quantity. *Involution* is the process of finding the power of a number.

POWERS, Hiram, sculptor, born in Woodstock, Vt., July 29, 1805; died June 27, 1873. He was the son of a farmer, and, after attending public school, he engaged with a clockmaker at Cincinnati, where he was instructed by a German sculptor named Eckstein. After acquiring considerable skill in modeling and pasteling, he went to Washington, in 1834, where he was engaged to execute busts of the President and a number of leading statesmen. His success enabled him to go to Florence, Italy, in 1837, where he devoted the remainder of his life to works of art. He is noted chiefly for his excellent busts of American statesmen. His statue of "Eve," completed in 1838, was admired by Thorwaldsen, and the following year he attained a world-wide reputation by his celebrated "Greek Slave." Other works of renown include "The Fisher Boy," "The Last of His Tribe," "Proserpine," and "America."

POWERS, The Great, the name employed in modern diplomacy to designate the most powerful nations. At the beginning of the 20th century they included Austria, France, Germany, Great Britain, Italy, Russia, and the United States. When the term is used in reference to Asia, it is extended to include Japan.

POWHATAN (pou-hà-tăn'), chief of the Powhatan Confederacy, born about 1550; died in 1618. His real name was Wahunsonacock, but he was called Powhatan from the name of

his tribe. He was a man of much native talent and through military successes he became the sachem of thirty tribes, which numbered about 8,000 persons. The region occupied by these tribes extended from the James to the Patuxent rivers. John Smith visited him in 1609, and soon after he accepted a gilded crown brought from Europe. Later he began to look upon the advent of the white man with displeasure and prepared to attack the English by night, but was foiled by the watchfulness of his daughter, Pocahontas. At one time he held Smith as a prisoner and condemned him to death, but through the plea of the chief's daughter his life was spared. He continued hostile to the English until the marriage of Pocahontas with Rolfe, when he became their firm friend.

POYNTER (poin'tēr), **Edward John**, British artist, born in Paris, France, March 20, 1836. He studied at Westminster School and Brighton College and while in Madeira for his health, in the winter of 1852-53, developed a strong taste for artistic painting. The following year he studied at Rome and in 1856 received training at Paris. His first exhibits at the British Institution were made in 1859 and in 1869 he became an associate of the Academy. During the interim he devoted much time to the study of Egyptian art and prepared illustrations for *Once a Week* and for Dalziel's "Illustrated Bible." He became professor of art in the London University College in 1871 and was made a full academician in 1876. In 1896 he succeeded Frederick Leighton as president of the Royal Academy and was knighted at Windsor. The paintings of Poynter are very numerous and of a high quality. They include "Israel in Egypt," "The Prodigal Son," "Golden Age," "Cecil Wedgwood," "Ides of March," "The Meeting of Solomon and the Queen of Sheba," "Earl of Harwood," and "Lord Ripon." He published "Ten Lectures on Art" and painted seventy cartoons for the mosaics in Saint George's, Winchester. The paintings of Poynter are quite true to nature and are pleasing because of their excellent coloring and finish. He died July 26, 1919.

POZZUOLI (põt-söö-ō'lě), a city of Italy, anciently called Puteoli, situated on the Bay of Naples, about seven miles west of Naples. It is of interest because of its ancient importance, when it contained the Temple of Augustus and an amphitheater with a seating capacity of 30,000 persons. The temple has been converted into a cathedral and the amphitheater, famous because of its gladiatorial fights under Nero, is in ruins and partly submerged in the sea. Among the other buildings of historic interest is the Temple of Serapis, an Egyptian god. This structure had a portico of 24 pillars, 13 of which still remain. It had several other temples of interest, the harbor of Puteoli, and numerous baths and tombs. Hannibal made an unsuccessful assault upon the

city in 214 B. C., and toward the latter part of the republic it was the principal port of Rome. A railway connects Pozzuoli with Naples. Population, 1916, 23,672.

PRAETOR (prē'tör), the official title of the consuls at Rome. In 367 B. C., the consulship was thrown open to the plebeians, and the patricians stipulated that a patrician magistrate should be appointed to act as supreme judge in the civil courts. His official title was *praetor*. The praetorship was opened to the plebeians in 336 B. C. Owing to the large number of foreigners residing in Rome, it was found advisable to appoint a second praetor about 245 B. C., whose duty was to decide suits between aliens or between aliens and citizens. In 227 B. C., the number was increased to four, the two additional praetors being elected to act as governors of provinces in Sicily and Sardinia. The number was increased to eight by Sulla, to ten by Julius Caesar, and still later to sixteen. These officers were elected by the people, and, after holding their offices for one year, they were sent out by lot as governors of provinces, when they were known as *propraetors*.

PRAETORIAN GUARD (prê-tō'rĭ-ān), the bodyguard of the Roman emperors, which was organized by Augustus to take the place of the old bodyguard attached to the person of the commander in chief of the Roman army, such as attended Scipio Africanus. Emperor Augustus formed nine or ten cohorts, which consisted of 1,000 men each and included both infantry and cavalry. Only three of these were kept at Rome, while the others were stationed in different cities of the empire. The nine cohorts were centered at Rome by Tiberius, and Vitellius successively increased their number until sixteen cohorts were organized. The praetorians held office for from ten to sixteen years, and their power became so great that they were able to raise and depose emperors at their will. Their high-handed sale of the throne to Didius Julianus, in 193 A. D., caused Septimus Severus to reorganize them by replacing their number with the most trustworthy veterans serving on the frontier. Constantine the Great finally dispersed them in 312.

PRAGMATIC SANCTION (präg-măt'ĭk sänk'shŭn), a term applied to a rescript issued by the head of a monarchy under the advice of his council to some order or body of people in relation to affairs of the state or the church. It was the custom of the princes of the Byzantine Empire to issue *rescripts* as declarations of law to individuals, but the solemn decrees issued by the sovereign became known as the *pragmatic sanction*. Since then it has been applied to solemn decrees issued in various countries. The most noteworthy include that of Saint Louis in 1269, which contains articles against the assumptions of the Papacy; that of Charles VII. of France, in 1438, embodying the most important decisions of the council

of Basel; that of 1439, giving the house of Austria control of the empire of Germany; that of Emperor Charles VI., in 1713, which finally passed the sovereign authority to his daughter, Maria Theresa; and that of Charles III. of Spain, in 1759, granting the throne of the two Sicilies to his third son and his descendants.

PRAGUE (präg), the capital of Bohemia and the largest city of Czecho-Slovakia. It is on the Moldau, which is crossed at this place by seven bridges, and is 152 miles northwest of Vienna. The city is beautifully situated and has wide and well-improved streets. Many of the thoroughfares are paved with stone, asphalt, and macadam. Much of the architecture is of brick and stone, including many tall buildings with steel frames. The most noted structures are the Saint Veits Church, a Gothic structure of the 14th century containing the remains of seven kings or emperors of Germany, the Hesse Church, with the grave of Tycho Brahe, the Roman Catholic cathedral, the Byzantine Church of Saint George, the Theresa Institution for Ladies, the vast Czerni Palace, and a number of modern governmental buildings. It has a large number of fine public schools and hospitals, several charitable institutions, a royal library, and numerous public parks and gardens. The University of Prague is one of the most noted educational centers of Europe.

Prague is centrally located on several railroads, has electric lights and street railways, and is the seat of a large jobbing trade. Among the manufactures are cotton textiles, silk and woolen goods, boots and shoes, beet-root sugar, spirituous liquors, clothing, leather, scientific instruments, machinery, engines, hardware, and pottery. Prague was founded by Princess Libussa in 722. The great university attracted students from every part of Europe in the 14th century. The Hussites conquered it in 1424, but it suffered greatly in the Reformation. Frederick the Great of Prussia captured it in 1744, and in the Seven Years' War it suffered or prospered according to the fortunes of battle. The Prussians occupied it in 1866, as the result of the Austro-Prussian War, which was terminated with the treaty signed here on August 23, 1866. In 1918 it became the center of political influence in Czecho-Slovakia. Population, 1919, 225,892.

PRAGUE, University of, an institution of higher learning in Prague, Bohemia. It consists of two sections, one German and the other Bohemian, of which the former is the older and more famous. Charles IV. founded it in 1348, when it included the four faculties of law, medicine, arts, and theology. Religious and political conflicts wrought many changes upon it in shaping the courses and causing the attendance to fluctuate. The Catholics were expelled from it in 1419, when it lost a large number of students, but it received a new impetus in the latter part of the 15th century. In 1654 it came

under the influence of the Jesuits, but in more recent times it has been directed by a policy of greater liberality. The Czech movement in the 19th century brought about the organization of the Czech section, which more recently outgrew in attendance the German department of the university. In 1914 the German section had an attendance of 2,100, while the Bohemian department was attended by about 4,000 students.

PRAIRIE (prā'rī), meaning meadow land, the name given by the early French settlers in America to extensive tracts of land which were destitute of trees. Subsequently the term was applied quite generally to the vast region lying between Ohio and Michigan on the east and the Rocky Mountains on the west, extending northward into Canada. The name applies locally only to fertile tracts which are entirely treeless, but, when speaking of prairie in the aggregate, considerable tracts of timber are necessarily included. The altitude of the great prairie region ranges from 100 to 2,000 feet above sea level. At Cairo, Ill., and Keokuk, Iowa, the altitude is about 400 feet, whence it gradually rises toward the north and northwest, giving the rivers a steady flow in all sections tributary to the Mississippi. The streams are bordered by belts of hardy and valuable timber, though there is a perceptible decrease in forest growth along the streams in some sections of Kansas, Nebraska, and the Dakotas, where portions of the surface are sandy and less productive than in other parts of these states.

This great prairie region includes fully 400,000 square miles. It has a generally undulating surface and comprises one of the most valuable and productive regions of the world. In northern Iowa, western Minnesota, and the eastern part of the Dakotas beautiful clear-water lakes are abundant. Prairie soil is mostly composed of a black vegetable mold and formerly many species of nutritious grasses were abundant, but now the region is covered by fields of cereals, meadows, orchards, and gardens. Though stones for building purposes are abundant in some sections, the soil is remarkably clear and unobstructed for cultivation, and forms the most desirable extensive farming region of North America. Formerly vast herds of deer, elk, buffaloes, and other animals were abundant, furnishing a prolific hunting ground for the Indians, but all these primitive conditions have given way to railroads, cities, and cultivated fields. Portions of the prairie region lying west of the 100th meridian are subject to an arid climate, and irrigation is resorted to for the purpose of supplying the necessary moisture. However, all parts are capable of supporting vast herds of cattle, horses, and sheep without cultivation or irrigation.

PRAIRIE CHICKEN. See **Grouse**.

PRAIRIE DOG, an animal native to the regions both east and west of the Rocky Mountains, but most abundant on the elevated prairies.

Prairie dogs are rodent mammals. They are allied to the marmot and prairie squirrel, but differ from the latter in having a more bulky body, a shorter tail, and a voice resembling the bark of a dog. They live in groups known as *towns*, or *colonies*. Their burrows are peculiar for having many compartments and an elevated mound at the exit, the opening for passage being at the middle of the mound. Several sentinels are stationed at convenient places and at the approach of danger give warning to those



PRAIRIE SQUIRREL.

PRAIRIE DOG.

who happen to be some distance from the colony. They are in no wise dangerous, though in some localities they devour much vegetable growth, and the quickness with which they enter their burrows on the approach of danger makes it exceedingly difficult to kill them. It is a remarkable fact that rattlesnakes and burrowing owls live in the same burrows with prairie dogs.

PRAIRIE DU CHIEN (prā'rè dū shēn'), a city of Wisconsin, county seat of Crawford County, sixty miles south of La Crosse. It is situated on the Mississippi River, has communication by the Chicago, Milwaukee and Saint Paul and the Chicago, Burlington and Quincy railroads, and is surrounded by a fertile farming country. The principal buildings include those of the county, the College of the Sacred Heart, and several fine schools and churches. Pickles, pearl buttons, machinery, and lumber products are the leading manufactures. A fort was built on its site by the French in 1689, but the first permanent settlement was not made until 1783. The United States came into possession of it at the close of the Revolutionary War, but it was captured by the British in 1812. The city was incorporated in 1872. Population, 1905, 3,179; in 1920, 3,537.

PRAIRIE SQUIRREL. See **Gopher**; **Prairie Dog**.

PRATT, Charles, merchant and philanthropist, born in Watertown, Mass., Oct. 2, 1830; died in New York City, May 4, 1891. He commenced business at an early age in New York City, where he made a vast fortune in the oil and paint trade, and was a principal stockholder of the Standard Oil Company. Among his not-

able gifts to education are endowments to the Brooklyn Adelphi Academy and the Pratt Industrial Institution of the same city.

PRATT, Enoch, philanthropist, born in North Middleboro, Mass., Sept. 10, 1808; died in Tivoli, Md., Sept. 17, 1896. He was educated at the Bridgewater Academy and in 1825 began business in Boston, but removed to Baltimore in 1831. He founded an institution for colored children at Cheltenham by donating 750 acres of land. Subsequently he founded the Maryland School for the Deaf and Dumb at Frederick, and in 1867 gave \$30,000 to an academy in the town of his birth. In 1882 he founded the Pratt Library in Baltimore by donating \$1,085,000. This library now has six branches, including about 200,000 volumes. He made a bequest of \$2,000,000 to the Shepherd Asylum, with the proviso that the name be changed to the Shepherd and Enoch Pratt Hospital.

PRATT INSTITUTE, an industrial and manual training school at Brooklyn, N. Y., founded by Charles Pratt in 1887. It is coeducational and maintains a high school as a means to obtain a general education. The departments include those of commerce, technology, and normal instruction. Both day and evening classes are maintained. The courses include cooking and sewing. A banking institution is maintained to induce saving and investment by the students. At present the endowment aggregates \$2,500,000. It has an enrollment of 3,500 students and a library of about 80,000 volumes.

PRAXITELES (prăks-īt'ē-lēz), an eminent sculptor of ancient Greece, who flourished at Athens about 364 B. C. Little was known of him personally even in the time of Pliny, but it is certain that he was one of the most eminent of Greek sculptors, and that he and Scopas were leading representatives of the later Attic school. His works were largely designed to display the beauty of Bacchic pleasures and the perfection of the human form, especially female figures. Among his most noted works were the statues of Aphrodite at Alexandria, Cnidus, and Rome, of which the one at Cnidus is the most celebrated. Other productions include the statues of Apollo, Eros, and Dionysius. He produced several groups of statues in marble and bronze, including the group of Niobe and her children, now at Florence, though some attribute this group to Scopas. Most writers think that Praxiteles marks an epoch in the history of Greece, since his sculptures show a transition from the heroic and reverential age preceding the Peloponnesian War to the more pleasurable forms of later times.

PREBLE (prēb'l), **Edward**, naval officer, born at Portland, Me., Aug. 15, 1761; died there Aug. 21, 1807. He became a privateer in 1777 and was made a midshipman in 1779, but was captured by the British soon after. However, he was released in a short time and served on the *Winthrop* until the close of the war. In

1782 he distinguished himself by capturing a British brig off Castine, Me., and was appointed to command the *Essex*. Later, in 1803, he commanded a squadron against Tripoli. After blockading the port of Tripoli, he bombarded the place repeatedly, but was relieved by Commodore Barron in 1804 and returned home. Congress presented him with a gold medal and a vote of thanks for his service.

PRECESSION (prê-sēs'hŭn), a term applied in astronomy to a slow motion of the equinoctial points on the ecliptic from east to west, causing the time between successive equinoxes to be perceptibly shorter than it would otherwise be. In 150 B. C. Hipparchus discovered that the equinoxes were falling back along the ecliptic, but, since the phenomenon depends for its explanation on the law of gravity, it was first explained by Sir Isaac Newton. This he did by showing that by the law of gravitation one body does not attract another in mass, but by acting on its separate particles, hence the sun does not attract the earth as a whole, but tends to pull the parts nearer to it away from those in proximity to the center, and those in the center away from the particles on the other side. The earth being flattened at the poles, there is a special tendency for the enlarged equatorial zone to be thus acted upon, and, if it were not for the rotation of the earth, it would be drawn down toward the ecliptic until it and the Equator would ultimately be in one plane. The rotation of the earth modifies this action, and causes the points at which the earth's Equator intersects the plane of the ecliptic to move slowly in a direction opposite to that in which the earth rotates.

The precession of the equinoxes is to be attributed to the sun and moon, though the latter is twice as potent in producing it, owing to its nearness to the earth. It has been observed that the rate of precession is 50.24" per year; that is, if we mark either point in the ecliptic in which the days and nights are equal over the earth, which is when the plane of the earth's Equator passes exactly through the center of the sun, we find that the earth the next year comes back to that position 12 min. 34 sec. of time earlier. Since the circle of the ecliptic is divided into 360°, it follows that the time occupied by the equinoctial points in making a complete revolution at the rate of 50.24" per year is about 25,800 years.

PRECIOUS STONES (prësh'ŭs). See **Stones, Precious**.

PRÉEMPTION (prê-ěmp'shŭn), the right of purchasing land before others, a privilege accorded by law to an actual settler upon public lands under certain conditions. The first pre-emption law was passed in the United States on March 3, 1801, and was designed to encourage colonization on the Miami River. A large number of special pre-emption acts were passed prior to 1830, but in that year the first law of

a general character took effect. The general law of 1841, which was repealed in 1891, gave actual settlers a prior right of purchase to 160 acres of public land. It was necessary to file a declaratory statement within thirty days after making settlement, and a final receipt was issued on proof of settlement and cultivation within a year after the declaratory statement was made. The price was \$1.25 per acre for lands outside the limits of railroad grants and within such limits, \$2.50 per acre. The right of preëmption extended to all persons over 21 years of age, who were unmarried or the heads of families, and those desiring to do so could convert a preëmption claim into a homestead. Under the preëmption law title could be secured to public land within a shorter time than under the homestead act, but those taking advantage of the latter received title without making any payment for the land.

PRENTICE (prĕn'tis), **George Denison**, journalist, born in Preston, Conn., Dec. 18, 1802; died in Louisville, Ky., Jan. 22, 1870. He graduated at Brown University in 1823, studied law, and in 1829 was admitted to the bar. However, he engaged as editor of the *New England Review* and in 1831 became editor of the *Louisville Journal*, which position he held until his death. His newspaper was an able champion of the Whig party and gave support to the Union cause throughout the Civil War. Prentice made his paper popular and influential by witty criticisms and able editorials. Among his published works are "Life of Henry Clay" and "Prenticeana, or Wit and Humor." The *Louisville Journal* became consolidated with the *Courier* after his death and is now known as the *Courier-Journal*.

PRENTISS, Benjamin Mayberry, soldier, born at Belleville, Va., Nov. 23, 1819; died at Bethany, Mo., Feb. 8, 1901. At the age of sixteen years he accompanied his parents to Missouri and later settled near Quincy, Ill. He served as a captain of volunteers throughout the Mexican War, in which he distinguished himself in several engagements, and at the beginning of the Civil War was commissioned as colonel in the Federal army. In 1863 he resigned from the army, having risen to the grade of major general. His service was of special value at Shiloh, where he defended a position assigned to him by General Grant, refusing to relinquish it without special order, which resulted in his capture. After the close of the war he was active in the Grand Army of the Republic. He was a member of the court-martial which tried and cashiered Gen. Fitz-John Porter.

PRENTISS, Sargeant Smith, orator, born in Portland, Me., Sept. 30, 1808; died in Longwood, Miss., July 1, 1850. He graduated from Bowdoin College in 1826 and the following year settled in the State of Mississippi. His remarkable oratorical power attracted the attention of the people and his law practice became unusually successful.

Prentiss served in the State Legislature a term of years. He was elected to Congress in 1837, but a contest of the election by Colonel Claiborne prevented him from taking his seat. In the following election he was given an overwhelming majority as a candidate for Congress, and at once became remarkably popular on account of his eminent wit, argumentative power, and natural oratory. The two speeches giving him the greatest eminence are one delivered in Faneuil Hall, Boston, at a dinner in honor of Daniel Webster, and one defending a friend on a charge of murder before a Kentucky court, over which Judge Wilkinson presided. He removed to Louisiana in 1845, because he regarded the repudiation of the bonded indebtedness of Mississippi a disgrace.

PREPOSITION (prĕp-ō-zish'ūn), in grammar, a part of speech which shows the relation between its object and some other word. In English the preposition generally precedes the noun which it governs. Grammarians usually agree that prepositions were originally either verbs or nouns, and generally class them with relational words. About forty prepositions are used in English, besides a number of participles that are employed as inseparable prepositions, such as *be-stir* and *be-speak*. In Greek there are eighteen prepositions and in Latin there are about fifty.

PRERAPHAELITISM (prĕ-răf'ă-ĕl-ĭ-tiz'm), the designation applied to an organization of painters, whose members avowed preference for the great masters who lived before the time of Raphael and drew inspiration for their work from nature rather than by following technical rules. This organization originated in the spring of 1848 and was designed to found a new school of artists who would make the study of nature their direct object. Rossetti, Hunt, and Millais were the three leading representatives and each made an exhibit at the Free Exhibition held in London in 1849. Rossetti exhibited the "Girlhood of the Virgin," Hunt presented "Rienzi," and Millais brought forward his "Lorenzo and Isabella." These works were very highly complimented. However, adverse criticism arose to the newly formed brotherhood, partly from the jealousy of contemporary painters. The discussion continued for some years somewhat to the disadvantage of the Preraphaelites, but Ruskin published several extended letters in the *London Times* in denunciation of those who assailed the new school and its promoters, and pointed out that good would likely result from the merit of their work and efforts. Subsequently many painters of this school became eminent, particularly those named above.

PRESBYTER (prĕz'bĭ-tēr), the title of an official in the Christian Church, derived from the synagogue. The name is used interchangeably with bishop in the New Testament. At first the title was given because of age or dig-

nity, and later a board of presbyters was maintained. In some cases they were appointed by the apostles and in others they were elected by the people. They were ordained by prayer and the laying on of hands. In the 2d century they filled a position immediate between that of deacon and that of bishop. It was their duty to discipline, teach, preach, receive strangers, visit the sick, and preside at the meetings.

PRESBYTERIAN (prěz-bĭ-tě'rĭ-an), a branch of the Christian Church, so named because the government is by presbyters, or elders. It originated shortly after the Reformation in Europe and is now represented by a large following in many countries of the world, particularly those of North America and Europe. The earliest society of several that paved the way for Presbyterianism may be said to have been the Waldenses, so named from Peter Waldo of Lyons, France, who left the Roman Church in 1170 and preached the gospel to a large following. However, according to some writers, the denomination is thought to have originated at Halle, Germany, where John Brenz drew up a plan of organization in 1526. Branches were formed soon after at Strassburg, Frankfurt, Geneva, and other cities under the leadership and direction of John Calvin, who is regarded the most influential of the early advocates of Presbyterianism.

The first Presbyterian church in London was founded in 1549, and soon after John Knox became the spiritual leader of the denomination in Scotland. He established a powerful organization at Perth in 1557. Presbyterianism is now the most potent Christian organization in Scotland and has a large membership in England. Westminster College, Cambridge, is its theological school in the latter country. Several closely allied branches are maintained in the United States, the two larger being known as the Presbyterian Church North and the Presbyterian Church South. The former branch has 1,512,075 communicants, and the latter has 362,390. Other branches include the United Presbyterian Church of North America, the Reformed, and the Cumberland. In Canada the Presbyterians have 2,250 churches and 337,248 communicants. At present the Presbyterian churches of the world have 68,500 ministers, 9,225,000 communicants, and 4,675,000 Sabbath school scholars.

All the Presbyterian churches have, as a primary element, a judicatory presbytery constituted of delegated elders, of whom the minister is always one. Among the functions of the presbytery are to examine applicants for entrance into the ministry and grant them license to preach the gospel, to fill vacant charges by ordaining ministers, to adjust cases appealed from the church sessions held within the presbytery, and to superintend all matters relating to doctrine and discipline affecting the several congregations within its territory. The provin-

cial synod may modify cases taken up on appeal from the presbytery, and appeal may be taken thence to the general assembly. This system of organization is maintained partly because of the unity of the church and partly on the ground that it is held to be in direct accord with the example set by the church in the apostolic age. For the latter reason it is looked upon as being in accord with the principles of church government that may be deduced from the Scriptures. The Reformed Lutheran Church, in points of doctrine, may be said to be the forerunner of Presbyterianism. It is now the recognized state church of Holland. In the United States it is known as the Reformed Church in America and by several allied organizations.

PRESBYTERY (prěz'bĭ-tě-r-ĭ), the general name applied to the body of elders or presbyters of the churches that have a Presbyterian form of government. It applies specifically to the elders and pastors who act in a judicatory capacity, ranking next above the court of a local church and below the synod. This body has the power to pass upon the qualification of those who apply for licenses to preach the gospel, to fill vacant ministerial charges by ordination, and to have general superintendence of the various congregations maintained within its jurisdiction, including points of both discipline and doctrine. It has general jurisdiction of complaints and appeals brought up from the local churches. Causes adjudicated by it may be reviewed by the provincial synod, whence they may be taken on appeal before the general assembly. The term presbytery is commonly applied to the residence of the priest or priests in the Roman Catholic Church.

PRESCOTT (prěs'kŭt), a city in Arizona, county seat of Yavapai County, 135 miles north of Phoenix, on the Atchison, Topeka and Santa Fé and the Prescott and Phoenix railroads. It is situated on an elevated site among mountains, which have deposits of copper, gold, and silver. The surrounding country produces wool, lumber, and cereals. Among the noteworthy buildings are the county courthouse, the high school, the Saint Xavier's Indian School, the public library, the Saint Joseph's Academy, and a number of churches. It has machine shops, waterworks, and a large trade in grain and live stock. Population, 1920, 4,380.

PRESCOTT, William, soldier, born at Groton, Mass., Feb. 20, 1726; died Oct. 13, 1795. He served in the expedition against Cape Breton in 1754 and two years later was promoted to the rank of captain. For some time he occupied his estate at Pepperell, Me., and in 1775 commanded a regiment of minutemen. He took part in the Battle of Lexington, commanded at Bunker Hill, and in 1777 coöperated in the campaign against Burgoyne at Saratoga. Subsequent to the Revolution he served in the Legislature of Massachusetts.

PRESCOTT, William Hickling, noted historian, born in Salem, Mass., May 4, 1796; died in Boston, Mass., Jan. 28, 1859. He was a



WILLIAM H. PRESCOTT.

grandson of William Prescott (1726-1795), an American Revolutionary officer, and in 1814 graduated from Harvard University. An accident while playing at college resulted in the loss of his left eye. His other eye, being sympathetically affected, caused him considerable inconvenience for many years, until in the later part of his life he was almost totally deprived of sight. He entered his father's office as a law student shortly after graduating, but soon decided to engage in literary work and made an extended tour in Europe, visiting France, England, Germany, and Italy. In 1820 he married Susan Amory and henceforth devoted his entire attention to profound study of history, which he conducted by the aid of secretaries.

The first writings of Prescott were published in the *North American Review* and consisted of essays and criticisms, but his study was devoted largely to Italian literature. In 1826 he began the study of Spanish history and, after laboring ten years, completed the "History of Ferdinand and Isabella," a work translated immediately into German, Spanish, and Italian. His next great work was the "History of the Conquest of Mexico," which he commenced in 1838 and completed in five years. In 1847 he published his "Conquest of Peru" and in 1855 issued two volumes of the "History of the Reign of Philip II., King of Spain." All the writings of Prescott sustained the interest aroused by his first attempts. He was a thorough scholar and an elegant writer, and was both methodical and persevering in his pursuits. His style is vigorous and interesting and his life stands as a splendid example of industry and perseverance in the endeavor to accomplish a laudable enterprise. Among his writings not mentioned above are "The Poetry and Romance of the Italians," "English Literature of the Nineteenth Century," "Critical and Historical Essays," "View of the Ancient Mexican Civilization," "Life of Hernando Cortez," "View of the Civilization of the Incas," and "Essay on Cervantes."

PRESCRIPTION (prê-skrîp'shŭn), the right title acquired by possession, either to personal or real property. It is the natural rule of the law that a person who has been for a long time in possession of property shall be regarded as the owner of it. This rule originated

from the fact that men are naturally inclined not to give up what belongs to them, and from the additional circumstance that it would be unreasonable without proof that the possessor is a usurper. Formerly a right acquired by possession was based upon immemorial adjoinment, but finally the term was shortened by statute to sixty years and ultimately to twenty years, which is now the time required to acquire title by possession in most subdivisions of Great Britain and the United States.

PRESIDENT (prêz'î-dent), the chief magistrate of a republic. This is the official title of the supreme executive officer of the United States. Presidents are elective, either by direct vote or through an electoral college, and serve for a definite term of years. The term of office of the president of Mexico and that of most of the South American republics is four years; of the French republic, seven years; and of the Swiss Confederation, one year. The term *president* was first used in America by William Penn, who proposed a scheme for the general government of the colonies, in 1696, and gave its chief executive that title. The Albany convention proposed that of president-general, and the Continental Congress chose a presiding officer termed president. No such officer as a President of the United States was provided for under the Articles of Confederation, but there was an executive committee of thirteen, one from each State. They had no power except during the recess of Congress, since that body possessed the executive power while it was in session. The constitutional convention of 1787 decided that there should be a single executive, to whom the title of President was given. The duty of the Executive Department is to see that the laws are faithfully and promptly executed, hence the efficiency of the President is one indispensable characteristic in the attainment of good government.

The term of office of the President is four years and he may be reelected from time to time, although public sentiment has operated against more than one reelection. The ten presidents chosen for two terms include Washington, Jefferson, Madison, Monroe, Jackson, Lincoln, Grant, Cleveland, McKinley, and Wilson; Cleveland did not succeed himself in the presidential office. Five vice presidents succeeded to the Presidency on account of the death of the presidents. The chief executives who died in office are William H. Harrison, who was succeeded by John Tyler in 1841; Zachary Taylor, by Millard Fillmore in 1850; Abraham Lincoln, by Andrew Johnson in 1865; James A. Garfield, by Chester A. Arthur in 1881; and William McKinley, by Theodore Roosevelt in 1901. The Constitution provides that the President shall be a natural born citizen and shall have resided at least fourteen years within the United States. The age of eligibility is 35 years and the salary is \$75,000 per year. It is specially provided that

the President shall not receive any other emolument during his incumbency from any State or from the United States.

Among the duties of the President are the conclusion of treaties with the advice and consent of the Senate, and, under the approval of that body, to appoint cabinet officers, ambassadors, ministers, consuls, and first, second, and third-class postmasters, and to grant reprieves and pardons, except in cases of impeachment. He may require in writing the opinion of any cabinet officer in relation to the duties of his respective office, and has the power to veto any bill passed by Congress, though a measure may become a law without his signature, if two-thirds of the members of each house vote to pass the bill over his veto. The President has appointive power with the consent of the Senate of judges of the Supreme Court, and all other officers of the United States whose appointments are not otherwise provided for.

Seven presidential cabinet officers may succeed to the Presidency in case of the death or removal by impeachment of both the President and Vice President. The order of succession is as follows: Secretary of State, Secretary of the Treasury, Secretary of War, Attorney-General, Postmaster-General, Secretary of the Navy, and Secretary of the Interior. The Secretary of Agriculture and the Secretary of Commerce and Labor cannot succeed to the Presidency for the reason that their positions were made cabinet offices after the passage of the succession law. Up to the ratification of the twelfth amendment, in 1804, the President and Vice President were not separately voted for in the electoral college, but the one obtaining the highest number of votes became President and the second highest, Vice President. Thomas Jefferson and J. Q. Adams were elected President by the House of Representatives, and Richard M. Johnson was chosen Vice President by the Senate in 1837.

The election of presidential electors occurs every fourth year, the first election occurring in 1788, and is held on the Tuesday after the first Monday in November in all the states. The electors chosen meet in the capitals of their respective states on the second Monday in January following their elections to cast their votes for President and Vice President. From each State the votes are certified to the president of the Senate, who counts them on the second Wednesday in February in the presence of both houses of Congress, and the newly chosen President and Vice President are inaugurated on the 4th of March thereafter. See **Electors; United States**.

PRESS, the newspapers or periodical literature of the country taken collectively. The liberty of the press has been regarded a matter of supreme importance by modern writers. Contentions regarding the freedom to utter and argue according to conscience prevailed for

many centuries. However, the freedom of speech was long restricted to narrow limits in many European countries, where it is still abridged more or less for political or other reasons. Originally the Constitution of the United States made no provision regarding liberty of the press, it being regulated by the states according to the established opinion of the people. In 1776 the states of Pennsylvania, Maryland, Delaware, and North Carolina adopted constitutions containing the earliest declarations in favor of the liberty of the press, and the first Congress passed an amendment to the Constitution providing that Congress shall make no law abridging the freedom of speech and of the press. In general, all citizens are held responsible for abuses and are liable for damages or to a fine in case they willfully and unjustly assail the character or motives of any citizen or alien. The British established a strict press-censorship over the colonies in 1637. However, it is now the policy of all nations to supervise more or less the publication of matters during the time of war. See **Printing**.

PRESQUE ISLE, a city of Aroostook County, Me., 42 miles northwest of Houlton, on the Canadian Pacific and other railroads. It is surrounded by a country which produces lumber, hay, potatoes, and dairy products. The features include the high school, public library, and State Normal School. It was incorporated in 1859. Population, 1920, 3,452.

PRESS ASSOCIATION. See **Journalism**.

PRESSBURG (prĕs'bŭrg), or **Presburg**, a city of Hungary, on the Danube River, 35 miles east of Vienna. It has a beautiful location on a range of hills belonging to the Little Carpathians, is well provided with railroad and steamboat facilities, and is the seat of an important commercial trade. Formerly the kings of Hungary were crowned in Pressburg and the city still contains the remains of a once beautiful royal palace. It has a cathedral of Gothic construction, a fine Franciscan church, numerous educational institutions, and several hospitals, parks, libraries, and monuments. Among the manufactures are woolen and silk goods, tobacco products, paper, leather, chemicals, starch, confectionery, machinery, and ironware. It has electric lights, street pavements, and other municipal facilities. It was the capital of Hungary from 1541 to 1784, but in the latter year Buda was made the capital by Emperor Joseph. German is the prevalent language and the inhabitants include about 7,000 Jews. Population, 1916, 86,768.

PRESTON (prĕs'tŭn), a city of England, in Lancashire, near the estuary of the Ribble River, 21 miles northeast of Liverpool. It has communication by steam and electric railways. The place is well platted and is surrounded with pleasing scenery. Among the most noteworthy buildings are the Gothic townhall, an exchange, several county buildings, and numerous churches, schools, and charitable institutions. It has a

free public library, an institution for the blind, and three large parks. Among the manufactures are spirituous liquors, cordage, brass fixtures, ironware, leather, clothing, and machinery. It is noted as one of the centers of linen and cotton manufacturing of England. The harbor has been improved materially. Preston has a large export trade in coal and imports of iron, corn, and timber. Population, 1921, 117,113.

PRESTWICH (prĕst'wich), **Sir Joseph**, geologist, born near London, England, March 12, 1812; died June 23, 1896. He studied at Reading and the London University College, and, after engaging for some time in commercial enterprises, he became devoted to a scientific career. His researches were made largely while connected with trade expeditions, and by means of them much knowledge was added to the fund of information in regard to the island possessions of Great Britain. He published, in 1851, his "Geological Inquiry Respecting the Water-Bearing Strata Around London," a work that remains a standard authority on the subject. In 1853 he became a member of the Royal Society. He was made president of the Geological Society in 1870, and while holding that position made several addresses relative to researches in the sea. He became professor of geology at Oxford in 1874, but retired in 1888 to devote his time exclusively to geological research. His writings include "Physical and Chemical Geology" and "Evidences of a Submergence of Western Europe at the Close of the Glacial Period." Queen Victoria knighted him in 1896.

PRETORIA (prĕ-tō'rĭ-à), a city of South Africa, capital of the Transvaal Colony, so named from Pretorius, an influential Boer leader. The place is on an elevated plain, on the southern slope of the Magalies Berge, 35 miles northeast of Johannesburg. It is connected by railway with Delagoa Bay, Johannesburg, Bloemfontein, Kroonstad, and Port Elizabeth. The country surrounding it is fertile, producing tobacco, wheat, sugar cane, cotton, coffee, indigo, fruits, and vegetables. Among the noteworthy buildings are those erected by the government, numerous churches, several gymnasia and high schools, and many fine residences. The streets are well paved and it has sanitary sewerage, telephones, waterworks, and other facilities. It was founded in 1855. The president of the Transvaal republic had his official residence at Pretoria. It surrendered to the British in 1900, after which the fort was dismantled. Population, 1921, 48,609.

PREVAILING WINDS. See **Wind**.

PRÉVOST (prā-vō'), **Eugène Marcel**, novelist, born in Paris, France, May 1, 1862. After studying in a Jesuit academy and the Polytechnical School, he engaged in manufacturing tobacco. In the meantime he published "Le Scorpion," a story written adversely to Jesuit edu-

cation, and in 1891 he entered the literary field. His writings are numerous and deal largely with educational and social questions. Among his chief works are "Notre compagne," "Le moulin de Nazareth," "Le jardin secret," "Nouvelle lettres de femmes," and "Cousine Laura."

PREVOST (prĕ-vō'), **Sir George**, soldier, born in New York City, May 9, 1767; died Jan. 5, 1816. He entered the British army in 1783, was made captain, and for some time served in the West Indies. In 1808 he was made Governor of Nova Scotia and was promoted to be administrator in Canada in 1811. The following year he succeeded Sir James Craig as Governor-General of British North America, which position he held throughout the War of 1812. In 1813 he undertook an unsuccessful attack upon Sacketts Harbor, N. Y., and the next year made an attempt to reduce Plattsburg, on Lake Champlain, where he was defeated by the Americans under Macomb. The British called him before a court-martial for his lack of enterprise, but he died before a verdict was reached.

PREYER (prĭ'ēr), **Wilhelm Thierry**, German physiologist, born in Manchester, England, July 4, 1841. He was liberally educated at Bonn, Berlin, Heidelberg, Vienna, and Paris. In 1867 he became professor of physiology at Jena, where he labored successfully for many years, and attained a reputation as one of the most eminent scholars of modern times. He formulated a theory of sleep and announced some new discoveries in regard to spectrum analysis. Among his writings are "The Struggle for Life," "Blood Crystals," "Physiology of the Embryo," and "Hypnotism."

PRIAM (prĭ'ām), in Greek legends, the King of Troy in the period of the Trojan War. He was the son of Laomedon and originally was named Podarces, but this was changed to Priam, which signifies the ransomed one, because he was saved from imprisonment and death by his sister, Hesione, after having fallen into the hands of Hercules. He married Hecuba, daughter of Dymas, King of Thrace, and among his renowned children were the prophetess Cassandra, the valiant Hector, and Paris, who caused the Trojan War. The city of Troy was under his government at the time of the famous Trojan War, which was caused by Paris carrying away Helen, but could have been prevented if he had restored her to the Grecians. His capital was destroyed after a siege of ten years, and he was killed by the hand of Neoptolemus while lying prostrate before the altar of Zeus, praying for divine assistance in the awful hour of peril. Homer does not mention his death, but it is recounted in the writings of Virgil and Euripides.

PRIBILOF (prĕ-bĕ-lōf'), or **Pribylov**, the name of a group of islands in the Bering Sea, 200 miles northwest of Unalaska, belonging to the United States. The group has an area of 170 square miles. Saint George, Saint Paul, and

Walrus are the largest islands of the group. Dense fogs surround them much of the time. They are valuable for the sea fisheries. Population, 1918, 400.

PRICE, Sterling, soldier, born in Prince Edward County, Virginia, Sept. 11, 1809; died Sept. 29, 1867. He studied at Hampton-Sidney College and removed to Missouri in 1831, where he served in the Legislature. In 1844 he was elected to Congress, became a volunteer in the Mexican War, and commanded at the Battle of Canada, in New Mexico. He was made military governor of Chihuahua, in 1847, and participated in the expedition of Kearney to California. In 1853 he was elected Governor of Missouri, was reelected to the same office, and at the beginning of the Civil War joined the Confederacy. At first he made a strenuous effort to win Missouri from the Federals, who finally compelled him to retreat to Arkansas, and later he took part in the battles of Pea Ridge and Corinth. He invaded Missouri in 1864, advancing as far as Pilot Knob, but was compelled to retreat before Pleasanton and Curtis. Subsequent to the war he founded a colony in Mexico, but returned to Missouri after the downfall of Maximilian.

PRICHARD (prich'ërd), **James Cowles**, physician and ethnologist, born in Ross, England, Feb. 11, 1786; died in London, England, Dec. 22, 1848. He was educated with much care in medicine and a number of modern languages, and secured an extensive training in history. His study was partly at the London Saint Thomas Hospital and at Edinburgh, Cambridge, and Oxford. In 1810 he located as a physician in Bristol, but was soon after appointed physician to the Bristol Infirmary. His first noted publication, "Researches into the Physical History of Mankind," appeared in 1813 and went through a number of revisions and translations. He published "The Eastern Origin of the Celtic Nations" in 1831, in which he compared the different dialects of the Celtic with the Teutonic, Sanskrit, and other languages. Other writings include "Analysis of Egyptian Mythology," "Diseases of the Nervous System," "Treatise on Insanity," and "Insanity in Relation to Jurisprudence."

PRICKLY ASH, a shrub or small tree which is native to North America. The plant is prickly and the smell of the leaves and bark resembles that of lemons. A stimulant useful in treating toothache and rheumatism is made from the bark, hence it is sometimes called *toothache tree*. Several species are found in the West Indies and the southern part of the United States.

PRICKLY PEAR, a plant native to North America. It is found along the Atlantic coast of the United States and in the Mississippi valley from Michigan to Arkansas. The species which are common to the region between Connecticut and Georgia are sometimes called *In-*

dian fig. They have a leafless, light green stem, produce pale yellow flowers, and bear an edible fruit an inch or more in length. The pulp of the fruit is juicy and has a sweetish but acid taste. The kindred species of the central Mississippi valley has larger flowers and fruit and a deep green stem. Several species of prickly pear have been introduced and are now propagated in European countries bordering on the Mediterranean and in China, Arabia, Persia, and Syria. The fruit is used extensively as food, but in some countries the plants attain a height of from five to eight feet and are useful as hedge plants. Several species of cacti are known as *prickly pear*. These plants are native to Mexico and the southwestern part of the United States. Several species have been improved for cultivation by Burbank, but in a wild state they are covered with spines.

PRIEST, a person ordained to fill religious offices and perform certain ceremonies. The history of the priestly office is nearly coextensive with that of religion, having been recognized from a very early date. It is related that Cain and Abel offered their own sacrifices, but the priestly office was established soon after. At first it was vested in the heads of families only, as in the case of Abraham, Isaac, and Jacob, but a special priesthood was established under the Mosaic law, when the Levites, the successors of Levi, furnished the priests and the high priests. The idea of a priesthood gained ground in the early pagan and Brahman religions, but the state church of China, which owes its systematization to Confucianism, has no special priesthood, though the priestly functions are exercised by the emperor and various state officers. The Greek, Armenian, and Roman churches maintain the title of priest, and they look upon ordination to this office as one of the sacraments. In the Roman Catholic church the priests are bound to celibacy, but the Greek Church and a number of the eastern branches permit the consecration of a married man as priest. Protestant churches look upon Christ as the real priest, who is held to be the only one who has the power of offering sacrifices for the people, and they regard the clergy as the teachers and servants of the church. While the clergy are divinely called and properly appointed, they are held to possess certain ecclesiastical rights and are to discharge certain duties. They derive these functions partly from divine and partly from human law. The word priest is retained by the Anglican and other Episcopal churches to denote the second order of clergy, ranking next to the bishops.

PRIESTLEY (prëst'li), **Joseph**, philosopher and divine, born near Leeds, England, March 13, 1733; died Feb. 6, 1804. He studied Latin and Greek in a public school, and later spent three years at a Dissenter academy at Daventry, London. In 1755 he became minister of a small congregation in Suffolk, and in 1761 was ap-

pointed teacher of languages at the Dissenter academy of Warrington. While there he married and commenced his literary career. He formed the acquaintance of Benjamin Franklin, while on a visit at London, who supplied him with a number of books of service in his study and research. His first published work, "The History and Present State of Electricity," appeared in 1767. About the same time he published "Theory of Language and Universal Grammar" and a work entitled "Vision, Light, and Colors." The University of Edinburgh granted him a degree in 1766, and shortly after he became minister of the Mill Hill Chapel at Leeds.

Priestley was the first to discover oxygen, which he called *dephlogisticated air*, and announced his discovery in his work entitled "Experiments and Observations on Different Branches of Air," which appeared in 1774. Lord Shelburne appointed him librarian and literary companion about that time with a salary of \$750 a year, and he accompanied the earl on a tour of Europe in the latter part of 1774. Later he was chosen minister of a Dissenter congregation at Birmingham and became noted as a writer and speaker in favor of the French Revolution, which so excited public opinion that a mob set his house on fire and caused his library and manuscripts to be destroyed. He was compensated for this outrage, but the award did not cover the loss. Priestley's advanced position upon scientific questions made him unpopular in England and in 1794 he came to the United States, settling at Northumberland, Pa., where his death occurred. Among his writings not already named are "Disquisitions Relating to Matter and Spirit," "Letters to Philosophical Unbelievers," "History of Early Opinions Concerning Christ," "Doctrine of Philosophical Necessity," "General History of the Christian Religion to the Fall of the Western Empire," "Institutes of Natural and Revealed Religion," and "Theory of the Human Mind." Priestley ranks high as an authoritative writer on scientific subjects, but his historical works on theology are not considered particularly valuable.

PRIM (prēm), **Juan**, Spanish soldier and statesman, born in Reus, Spain, Dec. 6, 1814; died Dec. 30, 1870. He was a son of Pablo Prim, a military officer of rank, and at an early age entered the military service. In 1837 he was appointed colonel in the regular army for distinguished services in support of the infant Queen Isabella, and, when the Espartero ministry was overthrown, in 1843, he was made general and created Count of Reus. The democratic rising that followed soon after at Barcelona caused the government to appoint him to restore order, but his dilatory course was the cause of his dismissal. He was accused of being implicated in the assassination of Narvaez, president of the council, in 1844, but his sen-

tence to six years' imprisonment was revoked by the queen the following year.

Prim entered the senate in 1858 and the following year commanded the Spanish reserve in the war against Morocco. In 1861 he secured command of the Spanish contingent and was sent to command the Spanish army in Mexico, but soon withdrew his forces, a course afterward approved by the Cortes of Spain. He led an insurrectionary movement against Queen Isabella in 1866, but its failure required him to flee for safety. However, he continued to direct the movements of the insurgents from Brussels until Queen Isabella was overthrown in 1868, and soon after he was appointed to the rank of marshal, thus becoming dictator of Spain. He offered the Spanish crown to Prince Leopold of Hohenzollern in 1870, which became the pretext for Napoleon III. to declare war against Germany. However, Leopold declined the proffered throne of Spain, and Prim induced the Italian prince, Amadeus, to accept it. Prim was wounded by an assassin on the day Amadeus landed in Spain and died two days later.

PRIMATES (prī-mā'tēz), the highest order of mammals, including man, the lemures, and the apes and monkeys. They are distinguished by having fore as well as hind limbs, which are capable of freer movement than similar limbs in ordinary quadrupeds in which the joints are formed so as to admit of less freedom of motion. Each limb in the primates has five digits, which are protected by flat nails instead of claws, and the fore limbs are grasping hands. Man and the anthropoid apes are similar in having nostrils close together and opening downward, while the chimpanzees and a few others are closely related to man in structure, especially in the form of the brain and the form and size of the bones. The gorilla, though approaching man in size, has a much smaller brain, especially the cerebrum, which is less than half as large as that of man. Other differences include modification in the size and form of the limbs, an erect posture in walking, and the exercise of the reasoning faculties. Although the gorilla and allied animals appear to have the faculty of communicating, man alone possesses articulate speech.

PRIME, **Samuel Irenaeus**, clergyman and editor, born in Ballston, N. Y., Nov. 4, 1812; died at Manchester, N. H., July 18, 1885. He graduated from Williams College in 1829, studied theology at Princeton, and in 1833 was called to the Presbyterian ministry. In 1840 he was required to discontinue pastoral work on account of feeble health, and from that time until his death he edited the *New York Observer*. He traveled in Europe several years and became famous for his *Irenaeus Letters*. In the meantime he contributed many valuable articles to *Harper's Magazine*. Prime made large donations to several benevolent societies

and was officially connected with Williams College. Among his writings are "Travels in Europe and the East," "The Power of Prayer," and "Old White Meeting House."

PRIME, William Cowper, journalist, born in Cambridge, N. Y., Oct. 3, 1825; died Feb. 13, 1905. In 1843 he graduated at Princeton College, was soon after admitted to the bar, and practiced law in New York City from 1846 to 1861. In the latter year he became editor of the *New York Journal of Commerce*, but discontinued the newspaper business after eight years and made an extensive tour of Palestine and Egypt. In 1884 he became professor of the history of art at Princeton College and subsequently devoted much time to literary work. For some time he was first vice president of the Metropolitan Museum of Art in New York City. Among his publications are "Tent Life of the Holy Land," "Owl Creek Letters," "Boat Life in Egypt and Nubia," "Pottery and Porcelain of All Times and Nations," and "The Holy Cross."

PRIMOGENITURE (prī-mō-jěn'ī-tūr), in law, the rule which confers a dignity or estate in land on a person by virtue of his being the eldest male of those who could inherit. It was recognized as a common feature in many of the ancient systems of law, but now the custom of primogeniture is not maintained to any great extent. Up to the time of the Norman conquests all sons inherited alike, but at that time the institution was established, although it was limited to narrower channels from time to time until it finally disappeared. As a system it operates to pass the title in all the real estate of the father to the eldest son, who in turn succeeds to the whole estate. However, if there are no male heirs, then the daughters inherit jointly, though this is not the case with the crown, which becomes vested in the eldest daughter.

PRIMROSE (prīm'rōz), an early flowering plant of the Alpine region of Europe and the temperate parts of Asia. Many species are cultivated in Canada and the United States.

PRINCE ALBERT, a city of Saskatchewan, about 200 miles northwest of Regina, on the North Saskatchewan River and on the Canadian Northern and Grand Trunk railroads. It has lumber and flour mills, brick yards, elevators, fishing and fur trading, and much shipping. The chief buildings include the high school, courthouse, Masonic Temple, and Empress Theater. It has a large local and jobbing trade. It was incorporated in 1885. Pop., 1921, 7,558.

PRINCE, the title applied to one who possesses royal honor or power, as the sovereign of a country. The term is used also in speaking of the sons of sovereign rulers, and the title of *princess* is applied to the daughters. In some countries a territorial addition is made to the title, as Prince of Orange, Prince of Wales, and Prince of Naples. The title is ap-

plied to a member of a high order of nobility, as in Germany, Holland, Belgium, and Italy, where it has reference to the rank immediately below duke, though in other countries it is used to designate a rank superior to that of duke. Many members of ancient families in Europe



PRIMROSE.

1, Cowslip Primrose; 2, Alpine Primrose; A, Fruit.

bear the title of prince, though they are not immediately connected with a reigning house, but in England the term is applied only to members of the royal family.

PRINCE EDWARD ISLAND, a Province of the Dominion of Canada, situated in the southern part of the Gulf of Saint Lawrence. It comprises all of Prince Edward Island, which is separated from Nova Scotia and New Brunswick by Northumberland Strait. The length from southeast to northwest is 120 miles and the width ranges from four to 35 miles. The area is 2,133 square miles, hence the Province is the smallest member of the Dominion.

DESCRIPTION. The coast line is remarkably irregular, being indented by many gulfs, bays, and inlets. Cardigan Bay, on the eastern coast, and many others, afford deep and spacious anchorage for large vessels. Most of the coasts are precipitous cliffs of red sandstone, ranging from 20 to 100 feet, and the soil is made up largely of a sandy loam, inclining in many places to a reddish color. Although the surface is undulating and in places hilly, no part of the island is more than 500 feet above the sea.

The streams are influenced to a considerable extent by the tides, having comparatively wide estuaries as they enter the sea. Though the rivers are short, they furnish considerable water power. The summers are pleasant and the winters are less severe than in Nova Scotia, being influenced noticeably by the sea. All parts are remarkably healthful. Fine forests of hemlock, cedar, fir, spruce, pine, and the hard woods

formerly covered the island, but the timber area has been greatly reduced.

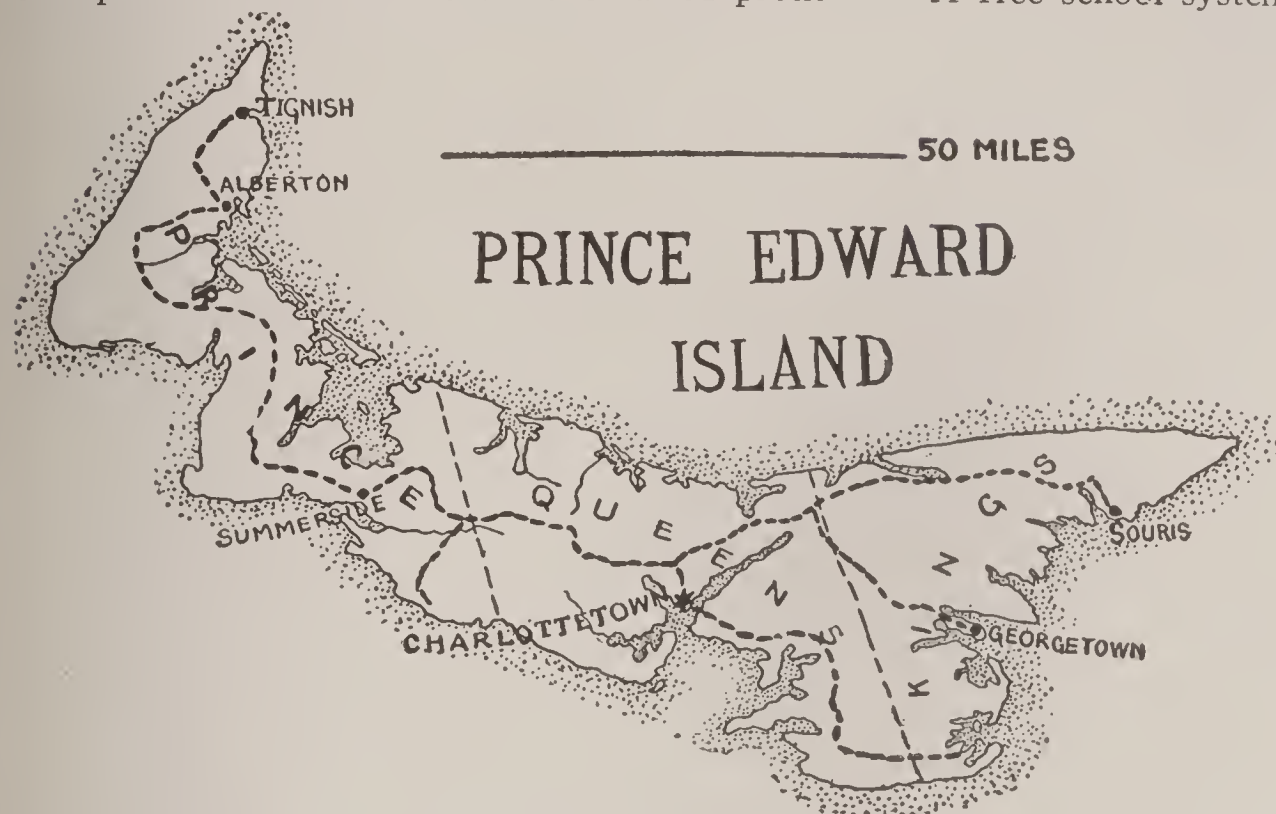
INDUSTRIES. Agriculture is the principal industry and fully two-thirds of the area is utilized for farming and grazing. Naturally the soil is highly fertile, but it has been injured through the cultivation of cereals for many years and natural manures obtained from the bays are used extensively. Oats, hay, wheat, potatoes, and turnips are the leading crops, but barley, rye, buckwheat, and garden vegetables are grown profitably. Dairy farming has developed to the condition of being an important enterprise. Cattle and horses are raised profit-

GOVERNMENT. The colonial government is similar to that of the other provinces in the Dominion. Chief executive power is vested in the Lieutenant Governor, who is appointed by the Governor General of Canada, and is assisted by an executive council of eight members. The legislative assembly has but a single chamber, whose members are elected by a popular vote. The judicial department embraces an admiralty district court, a superior court, and several minor courts. For the purpose of local government it is divided into the three counties of Prince, Kings, and Queens.

A free school system was established in 1851.

The schools are undenominational and are administered by a superintendent and a council appointed by the government. They are supported partly by funds derived from government grants and partly by direct taxation. A well-organized high school with an advanced course of study is maintained at Charlottetown.

INHABITANTS. The density of population is fifty to the square mile, the highest for any Province in the Dominion. Most of the inhabitants are of British



MAP OF PRINCE EDWARD ISLAND.

ably and the breeds grown are of a high class. Other domestic animals include sheep, swine, poultry, and silver foxes.

Fishing ranks second among the occupations. The catches include lobsters, hake, herring, cod, oysters, and mackerel. Oyster dredging is followed extensively. The fisheries yield products for canning and curing and in this form large quantities are exported. The other manufactures are principally for domestic use. They consist mainly of butter, cheese, earthenware, clothing, machinery, and lumber products. The mining industry is not developed to any great extent, but building stone and clays are found in paying quantities.

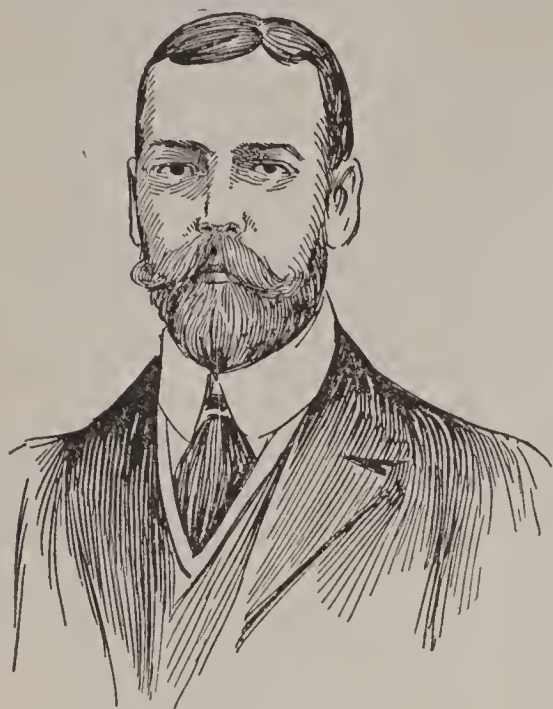
Communication is provided by a railway that extends the entire length of the island and branches are operated to some of the more important maritime towns. The lines in operation, a total of 280 miles, were built and are still owned and operated by the government. Highways of a superior class are maintained in all parts of the island. Steamboat communication extends to the leading ports in Canada and the United States, but during the winter communication is much restricted, except with New Brunswick, with which vessels communicate the entire year.

origin. The Anglicans, Presbyterians, Methodists, Baptists, and Roman Catholics are well represented in the Province. Charlottetown, on Hillsborough inlet, is the capital and largest city. The principal towns include Summerside, Georgetown, and Alberton. Population, 1901, 103,259; in 1921, 88,615.

HISTORY. Prince Edward Island was discovered by Sebastian Cabot in 1497 and was claimed by Champlain for France in the early part of the 17th century. The Count of Saint Pierre secured a grant of it in 1719 and made an unsuccessful attempt to found colonies. It was seized by the British in 1745, but was restored to France by the Treaty of Aix-la-Chapelle. It was finally annexed by Great Britain and placed under the administration of Nova Scotia in 1758, but soon after a separate government was established for it. Canadian confederation was decided upon in 1864 at a conference held at Charlottetown, which resulted in the establishment of the Dominion in 1867, but Prince Edward Island did not enter the confederation until in 1873. The prohibition law, the income tax act, and the act providing for the general improvement of highways were enacted within recent years.

PRINCE OF WALES, the title conferred

upon the heir apparent to the throne of Great Britain, originally borne by the sovereigns of



GEORGE V.

Wales. It was first conferred to please the Welsh at the time of the conquest of Wales, in 1284, by Edward I., on his son, who afterward became Edward II. The title was not borne by Edward III., but he conferred it upon his son, Edward the Black Prince, in 1343, and since that time it has been borne by the eldest son of the reigning sovereign. The title is bestowed by individual investment and is accompanied by the earldom of Chester, but the eldest son is by inheritance Duke of Cornwall, a title first conferred by John of Eltham, the last Earl of Cornwall, on Edward the Black Prince, in 1337. The Prince of Wales as heir to the crown of Scotland also bears the titles of Earl of Carrick, Duke of Rothesay, Lord of the Isles, Baron of Renfrew, and Prince and High Steward of Scotland. The late Prince of Wales, now George V., was born at Marlborough House, London, June 3, 1865. He received the title of Prince of Wales from his father, Edward VII., in 1901. In 1893 he married Princess Victoria Mary, of Teck. He succeeded his father as King of Great Britain and Emperor of India in 1910.

PRINCETON (prĩns'tũn), a city in Indiana, county seat of Gibson County, 26 miles north of Evansville. It is on the Southern and the Evansville and Terre Haute railroads and is surrounded by a fertile agricultural region, which produces cereals and fruits. The principal buildings include the county courthouse, the public library, the high school, and a business college. Among the manufactures are flour, agricultural implements, and clothing. The city has regularly platted streets and good municipal facilities. It was settled in 1804 and incorporated in 1838. Population, 1920, 7,132.

PRINCETON, a borough of Mercer County, New Jersey, on the Delaware and Raritan Canal, 45 miles northeast of Philadelphia, Pa. It is on the Pennsylvania Railroad, has well improved streets, and is noted as the seat of Princeton University. Other features include the Princeton Theological Seminary, the Princeton Preparatory School, and many fine churches and residences. In 1777 Washington defeated the British forces at Princeton and the Conti-

mental Congress held its session here in 1783. Population, 1905, 6,029; in 1920, 5,917.

PRINCETON, Battle of, an engagement of the Revolutionary War, fought at Trenton, N. J., between the Americans under Washington and the British under Cornwallis. On Jan. 2, 1777, after the Battle of Trenton, the Americans took a position on the bank of the Assunpink River, where they were confronted by about 8,000 British. Washington was unable to cope with the superior force, hence resorted to strategy. Leaving a small force to keep the campfires burning and to make a noise, he moved with the larger part of his army around the British left and encountered their reënforcements at Princeton on the 3d. By thus cutting the British lines, he forced Cornwallis to retreat to New York, thus giving the Americans a clear field between Philadelphia and the Hudson. The Americans lost about 100, while the British loss was 200 killed and 300 prisoners.

PRINCETON UNIVERSITY, formerly the College of New Jersey, a celebrated educational institution, at Princeton, N. J. Though nonsectarian, it is closely allied to the Presbyterian denomination and is for men only. It was founded in 1746 by charter from John Hamilton, president of His Majesty's Council, and was established with the view of providing ample means for the intellectual and religious culture of those desiring a liberal education, but more especially for the training of candidates for the ministry. The institution was opened at Elizabeth in 1746 under the presidency of John Dickinson, who was succeeded on his death in the same year by the Rev. Aaron Burr. In 1748 it was removed to Newark, where it remained until 1757, when it was removed to Princeton, and Nassau Hall was erected and named in honor of William III. The Presbyterians united to support the college in 1766 and in 1812 established the Princeton Theological Seminary, an institution still unconnected with it. Nassau Hall is the oldest college building and is historic on account of being used as a barracks and hospital by the Americans and British at different times in the Revolution. In the Battle of Princeton, on Jan. 3, 1777, a cannon ball passed through the walls, and in 1783 it was the meeting place of the Continental Congress.

The second president of the college was the father of Aaron Burr, afterward Vice President of the United States, and other noted presidents include Jonathan Edwards and James McCosh. It was during the presidency of the latter that the institution reached its present importance, since it received endowments during his incumbency of twenty years which exceeded \$3,000,000. Within this period the departments of language and literature, philosophy, mathematics, and science were established on a firm basis. John C. Green, in 1873, made a liberal endowment to establish the departments of civil

engineering, general science, and electrical engineering. The graduates from Princeton include some of the most eminent men of America, among them James Madison, fourth President of the United States. It has adequate and advanced courses of study, 107 endowed scholarships, a library of 300,000 volumes, 212 professors and instructors, and about 1,500 students. The periodicals include the *Princeton Review*, which was founded in 1825 and was edited by Charles Hodge until 1872, when it was united with the *Presbyterian Quarterly*, now published in New York.

PRINTING, the art of making matter for reading by means of type and the printing press on cloth, paper, or other material. It is frequently referred to as "the art preservative of arts," since it supplies the most efficient means of recording knowledge for the use of future generations.

HISTORICAL. The Chinese were the first to use movable types in printing, and there is evidence that they cut classics upon tablets and made impressions with them as early as 175 A. D. Several of these classics are still extant, while records published in the 6th century are numerous. Printed books came into common use in China in the 10th century. It is remarkable that little progress has been made by the Chinese since they first used wooden blocks for making impressions, and their printing is done quite like it was originally. From 5,000 to 10,000 movable characters are necessary, since each movable type represents a word instead of an elementary sound. Each character is supplied with ink by a brush and pressed upon the paper by the hand of the printer. In some of the larger offices forms are prepared and the printing is done by methods much like those employed in an old-style Washington hand press, while many of the books are printed from blocks on which each page is engraved by itself. In the 12th century blocks were used for ornamenting fabrics in Europe, while playing cards were printed from blocks in the 14th century, and movable type for printing was invented about the middle of the 15th century.

The credit of inventing movable type is claimed by some for Lourens Coster, of Haarlem, Holland, but others think the invention due to Johann Gutenberg, of Germany. It is probable that both made inventions about the same time, but the art was first practically applied by Gutenberg, who published an edition of the Bible in Latin about 1445. Those claiming the honor for Coster show specimens of printing found at Haarlem, but it is singular that none of the early printed matter contains the names of those associated with the productions. Gutenberg was located at Mentz and Strassburg and was supported financially by Johann Fust and Peter Schoeffer, who aided him in producing many of the earliest printed matters in the German. Soon after the art was

carried to France, Austria, and Italy, and in 1471 William Caxton introduced printing into England by setting up a press in Westminster Abbey. A strict censorship was established in England over the printers in 1530, largely because of the influence exercised by Cardinal Wolsey and others prominently connected with the church. The censorship was discontinued in 1694, after long years of limitation and persecution, and literature and learning immediately experienced a remarkable revival.

Antonio de Mendoza, viceroy of Mexico, founded the first printing establishment in America in 1536, and 103 years later the first printing press was set up within the present territory of the United States, at Harvard College, in Cambridge, Mass. The first printing office at Philadelphia was founded in 1685 and at New York in 1693, but many other similar establishments were installed in rapid succession.

METHODS. Three distinct processes are employed in the modern methods of printing, known as composition, imposition or make-ready, and press work. *Composition*, the first step in printing, consists of setting the type. This is done by the *compositor*, who stands before the *case* in selecting the individual types, which he sets up in a metal frame called the *stick*. About twelve lines are usually set in the stick, after which they are transferred to the *galley*, of which a *proof* is taken for the use of the *proof reader*, who indicates any errors in the work by pencil marks.

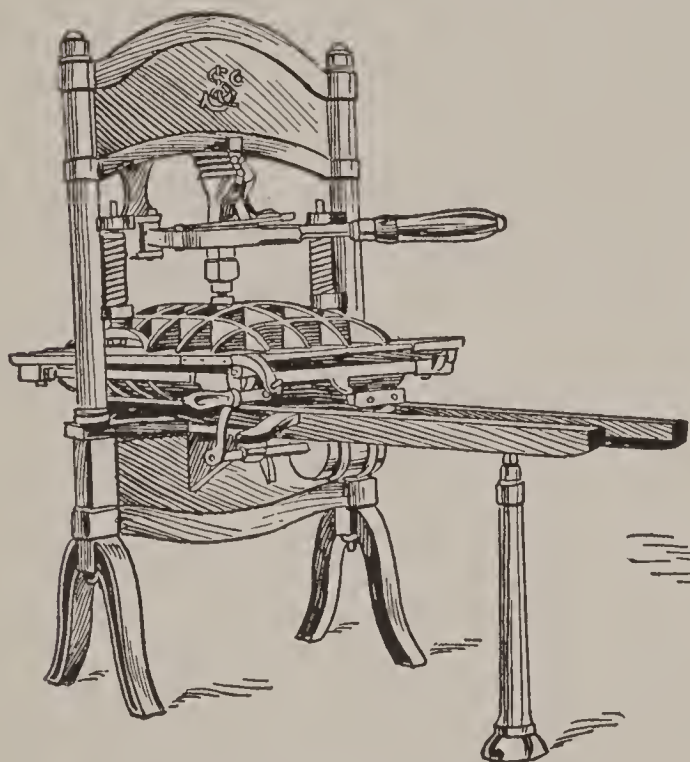
Imposition or *make-ready* is the process of forming pages of the type, which involves putting in page numbers, headlines, and running titles. This work is done on a table with a stone or iron top by a workman known as the *stone man*. After the pages are completed, each page is wedged into an iron frame or *chase*, when the frame and the type constitute the *form*. *Page proofs* are usually taken before the forms are completed, hence the pages are now ready for the printing press, or they are sent to the electrotypers, in case the printing is to be from plates. The *printing* is done on a printing press, which is propelled by hand, or by steam or electric power.

Formerly all the composition was done by hand as described above, but in the larger establishments much of the type now is set up by machinery. In setting type by machines a single operator is able to accomplish as much as from three to five persons working by hand, the difference depending upon skill and the kind of machine used. Many styles of type-setting machines have been invented, all of them being supplied with a keyboard, similar to a typewriter. They may be divided into three classes: those like the *Simplex*, setting the type; those like the *Mergenthaler*, setting matrixes and casting full lines to be used in printing; and those like the *Monotype*, casting and setting

type singly, instead of in a line. Improvements have likewise been made in the manufacture of printing presses until now 100,000 perfected sheets may be printed in an hour on a single machine, instead of a few dozen, as was the case when printing was first employed.

PRINTING PRESSES. The printing presses used up to the 17th century consisted of a contrivance whereby the form of types was run under a screw press. By turning the screw by hand, similar to the screw of a letter-copying press, the pressure was applied, and, after withdrawing the form, the printed paper was replaced by another sheet. William Jansen Blaen, of Amsterdam, invented a wooden press whereby it was possible to secure an impression by releasing a spring after placing the form of types in position, and this style of press continued in use until the latter part of the 18th century. The Earl of Stanhope improved the hand press in 1800 by inventing a mechanical device where-

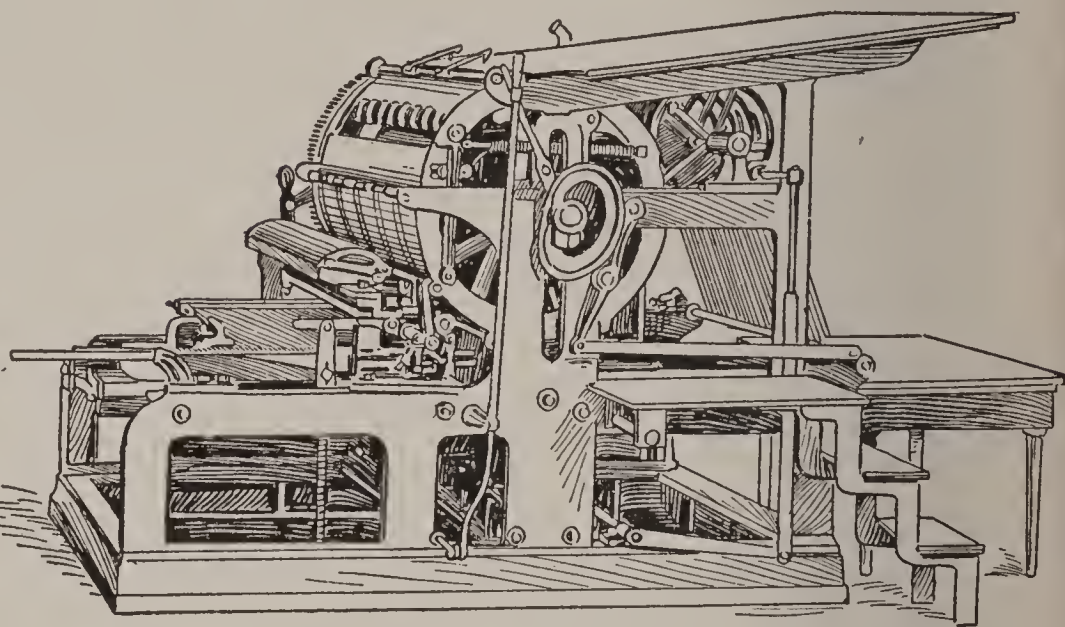
made to propel a printing press by steam power. This machine had a capacity of 1,800 impressions per hour. Soon after completing this improvement, in 1814, he devised additions whereby the paper, after being printed on one side by a cylinder, was placed in position and printed by a second cylinder on the other side. Many valuable improvements followed in rapid succession. The first notable improvement made, in the invention of rapid-printing machinery may be credited to Richard M. Hoe, of New York, who made a rotary press in 1847 that had a capacity of 20,000 papers per hour, but the impressions were made only on one side. Such machines as the *Cranston press* are now used in the medium class of newspaper offices. Sir Rowland Hill was the patentee of the first web perfecting press in 1835; that is, a press capable of printing from a continuous roll of paper on both sides and cutting and folding the sheets. Walter Scott, of Chicago, in 1879, de-



WASHINGTON HAND PRESS.

by pressure was secured through the action of levers, and in 1818 George Clymer, of Philadelphia, made other improvements. His press is known as the *Columbian* and the printing was done by bringing steel jaws together by means of a lever. It was operated by two men and had a capacity of about 180 impressions an hour. The *Washington press* was invented in 1829. It is used extensively in country printing offices, and undoubtedly possesses the highest degree of mechanical completeness possible to be put into a press to be operated only by hand. While not rapid, it does its work with much accuracy.

Modern rapidity in printing may be said to date from 1811, when Friedrich Koenig, a German printer, invented a cylinder press that had self-inking rollers and carried the paper on tapes through the machinery. He soon after improved the machine by adding the double cylinder and supplying the first apparatus ever



CRANSTON NEWSPAPER PRESS.

voted much attention to press improvements, and the *Scott web perfecting press* may be regarded as one of several combining all the newer features of the best machines now used.

Modern perfecting presses are mammoth machines and contain a multiplication of cylinders and forms in one general framework. The paper used is in one continuous roll, varying in length from three to ten miles, and is of the desired width for printing. It is placed on a rack at the end or above the press and is unrolled at any speed required by the machine. The paper is printed on both sides and cut, and is then folded and the forms are counted by the machine. The largest presses are fed by four rolls of paper, usually 63 inches in width, and the capacity of the most rapid is sufficient to turn out about 140,000 four-page papers in an hour. Among the best known perfecting presses are the Campbell, Walter, Potter, Goss, Hoe, Cottrell, and Bullock. Printing in the larger



GUTENBERG'S FIRST PROOF

(Opp. 2314)

offices is done almost exclusively from stereotyped or electrotyped plates made after setting the type by machines.

PRISM, a solid whose lateral faces are parallelograms and whose ends or bases form similar, equal, and parallel plane figures. The term is applied in optics to an instrument made of some transparent substance, as quartz, glass, or a prismatic glass case filled with transparent liquid. Such an instrument is usually of a form having equal and parallel triangular ends and whose three sides are bounded by three parallel lines, extending from the three angles of one end to the three angles of the other end. A ray of white light is bent twice from its course in the same direction in passing through such a prism, once on entering and once on leaving, and the different colors are separated so as to form a spectrum. An *achromatic lens* is one that transmits light without separating it into its constituent colors. Light may be achromatized by joining prisms or other refracting bodies which have opposite dispersing power.

PRISONERS OF WAR, the persons who are captured from the enemy in the time of war, whether in military or naval operations. Prisoners of war were anciently treated with great severity and those captured from the vanquished enemy were recognized as the property of the victors, who either reduced them to slavery or put them to torture and death. The practice of putting to death nonparticipants came into disrepute with the advance of civilization, but for many centuries all those claiming allegiance to the enemy were reduced to serfdom or slavery, and were either employed by the successful nation or sold into bondage to friendly states. It was the common practice in Greece for centuries to destroy the adult male population of the enemy and enslave the women and children. In the early part of the 13th century A. D. more humane treatment of prisoners of war became general, and the exchange of prisoners was established as a common custom. All civilized nations now treat prisoners of war in a humane manner. They provide for the wounded and look after the burial of the dead. Prisoners of war are kept in safe confinement until peace is concluded, unless either exchanged for prisoners taken by the opposite army or navy, or given liberty on parole. Many instances are on record in which modern prisoners of war were treated severely, though in most cases on account of unavoidable circumstances, or because the nations making the capture were to be classed among the savage or semicivilized.

PRISONS, the institutions which are constructed and maintained by states or nations as places of confinement for the safe keeping of persons in legal custody. The prison system may be said to be a result of modern civilization, since it has followed in its completeness the abolition of slavery and the feudal system

prevalent for many centuries in most countries of Europe. Instead of allowing the slave masters or feudal lords to institute systems of punishment, as was formerly the case, an offender against the peace and dignity of a state is now looked upon as a public charge and is held for trial in a jail or bridewell, and, after being tried and sentenced, he is sent to a workhouse, house of correction, reformatory, or penitentiary. The punishment is not designed to cause the prisoner to suffer physically or mentally, but all civilized nations are taxing themselves to provide prison systems that shall be more reformatory in character, not only separating the offender from the public as a benefit to the public, but also for the purpose of reforming the individual and leading him to become and remain a law-abiding and useful citizen.

In some countries death punishment is inflicted for the aggravated cases of criminal conduct, but many leading writers and students are beginning to look upon crime as a disease. According to this view the inclination toward crime is inherited very much the same as other traits of character or tendencies toward physical imperfections. Whether this or some other humane view of those inclined to crime is taken, it is certainly hopeful to notice that many reforms are being effected in the treatment of prisoners and the construction of houses of confinement. However, in some county jails and minor prisons much imperfection still exists. Many of these institutions are not only illy constructed, but their management is open to criticism. In many counties the jails are large buildings and are provided with well-planned residence additions for the sheriff or bailiff. All the modern buildings of this kind are provided with separate cells for the confinement of youths and women, while in others the adult male prisoners are consigned to separate departments with the view of classifying them according to the nature of their character and reputation. The number of county jails in the United States is about 2,475 and the number of Federal and State prisons and penitentiaries is 78. The last census gives the number of prisoners in State prisons and penitentiaries at 47,500, in county jails at 20,500, and in city prisons at 4,250. Besides these are many workhouses and other correctional institutions that contain a considerable number of inmates.

Modern progress in reforming prison practice may be said to date from the early part of the 18th century, though in some countries dark dungeons were maintained long after that, in which prisoners were confined under the most objectionable circumstances. In some cases the prisoners perished after a short period of confinement. The Philadelphia Society for Assisting Distressed Prisoners dates from 1776, and may be said to be the first efficient organization in the world designed to reform prison practice.

Previously the benefits of separating prisoners were not recognized, but this and other similar societies inaugurated reforms in prison construction and discipline, and in the early part of the 19th century many of the states followed Pennsylvania in abolishing capital punishment, except for murder in the first degree. In 1829 the penitentiary at Philadelphia adopted the so-called *Pennsylvania System*, under which some classes of prisoners were permanently secluded from others. This system has been superseded almost universally by the *Auburn System*, by which convicts are separated by night and required to labor in silence with associates by day.

In 1825 the first institution for juveniles was established in New York, while Ohio was the first State to provide separate places of detention for juveniles, founding a reformatory for boys at Lancaster in 1858 and one for girls at Delaware in 1878. These institutions are now generally called *industrial schools* and are maintained in most of the states. Those confined there are taught the common school branches and various industrial pursuits, their labor being utilized quite largely to support the institutions. The chief occupations in which prisoners are employed include making brooms, furniture, utensils, buttons, boots and shoes, clothing and farming implements. In some counties prisoners are employed in mining, carpentering, building railways and highways, and constructing various other public improvements. In some states the prisoners are leased to those bidding highest for their labor, but this system is gradually going out of use. While the employment of prisoners is looked upon as a benefit to those in confinement, it should be the constant aim of the government to employ them at work that does not come into competition with free labor, since otherwise the system interferes with those having to support their families and the State. The *marking system* is employed in all prisons to a varied extent, under which the prisoners may by good conduct and industry shorten considerably the term of confinement. An examination into the condition of prisoners in the United States has disclosed that 75 per cent. have no trade, 24 per cent. are unable to read and write, and the average age is about thirty years.

PRITCHARD, Jeter Connelly, public man, born in Jonesboro, Tenn., June 12, 1857. After studying at public schools and Martins Creek Academy, he was apprenticed to a printer. At the age of fifteen years he removed to Bakersville, N. C., where he subsequently published the *Roan Mountain Republican*. In 1884 he was elected to the State Legislature, was reelected in 1886 and 1890, and in 1895 was chosen for the unexpired term to the United States Senate. He was reelected to the Senate in 1897 and on expiration of his term, in 1903, he was made associate justice of the Supreme Court of the District of Columbia. For a number of years

he was the only Republican Senator from the South, and was a leader in the movement to develop a White Republican party in the Southern States, members of which became known as the *Lily-Whites*.

PRIVATEER (prī-vā-tēr'), a vessel owned and officered by private individuals, and licensed by letters of marque to carry on maritime war against the commerce and ships of an enemy. More than 400 privateers were fitted out by the British colonies to ravage the commerce of France in the colonial wars of America, and these inflicted great damage along the coast of the French possessions in Canada, in the West Indies, and on the coast of France. The Continental Congress authorized privateers in 1776, and before the end of that year they captured 342 British vessels. Since the owners and crews of privateers were given a large share of the prize property lawfully captured by their vessels, many sailors were attracted to the privateer service throughout the Revolution. In 1778 an American privateer captured the British fort of New Providence, in the Bahamas, and a sixteen-gun man-of-war. More than 500 British vessels were captured by American privateers in the War of 1812, and the service became so well organized that immense damage was done to the British on the coasts of the West Indies, the Canary Islands, and even Great Britain. In 1856 the great powers of Europe united in the Declaration of Paris, whereby it was mutually agreed that privateers should no longer be licensed, but the United States and several other nations have never accepted the treaty.

PRIVET (prīv'ēt), an ornamental, bushy shrub native to Europe, but naturalized in some sections of North America. The several species include some that are evergreen or nearly evergreen. Several species are used for hedges. They have opposite, entire leaves and small white flowers with a pleasant odor, and yield a small, globular berry, mostly black, but sometimes yellow or greenish in color. The wood is of value for making shoemakers' pegs and for turners' products, while the berries yield dyes and are of service as bird food.

PRIVY COUNCIL (prīv'y), the council of the sovereign of Great Britain. It is constituted of persons nominated by the crown at will, and of others on account of their rank or position. The Privy Council originated in the Norman period, but since the duties of government were assumed by the Cabinet its political importance has been greatly diminished. Among the members of the Privy Council are the Prime Minister, the members of the Cabinet, the archbishops, the Bishop of London, the Lord Chancellor and chief judges, the Commander in Chief, the great officers of State, the speaker of the House of Commons, and numerous dignitaries who are or were in responsible offices under the crown. The crown is limited in making nominations for the Privy Council to nat-

ural-born subjects, but no patent or grant is necessary. The Lord President of the Council is its legal head, and the debates and reports from the Council to the crown are under his direction. At present the Privy Council is rarely consulted, since its offices have been superseded largely by the Cabinet. Among the important functions exercised by it in recent times are the examination of George III. as to sanity, in 1788, and the determination whether Queen Caroline as queen consort had a right to the crown, in 1821. *Right Honorable* is the title of a Privy Councilor. All the proceedings of the body are conducted in secrecy.

PRIVY SEAL, the minor seal appended by the sov reign of Great Britain to certain documents, which are afterward authenticated by the great seal. It was used as early as the reign of Edward III., and for centuries was affixed by the authority of the Lord Chancellor. In 1884 an act was passed that all instruments to receive the great seal need only to be countersigned by the Lord Chancellor, Secretary of State, or a high official of the treasury. The privy seal is in the care of an officer called the *lord privy seal*, who now ranks as fifth great officer of the State, and is usually a member of the Cabinet.

PROA (prō'ā), a sailing boat about thirty feet long and three feet wide, used extensively by the natives of the Ladron Islands and other islands of the Malay Archipelago. It is built with a stem and stern of similar structure, and may be sailed equally well in either direction. One side is flat, on a line from the stem to the stern, while the other side resembles an ordinary boat. The vessel is prevented from tipping by a frame extending to leeward, and in some boats the outrigger extends to both sides. Proas are of various sizes and their shape makes them capable of swift sailing under an ordinary pressure of wind upon the sail.

PROBATE COURT (prō'bât), a court that has jurisdiction of the proof of wills and the settlements of estates. The judge of a probate court is the officer who has charge of the instruments that purports to be the last will and testament of a person deceased. When a party files a will, after the decease of the testator, it is required in most cases that a notice of the same be published, and all interested may then appear at the time of hearing at which it is sought to admit the will to probate. A party offering a will is said to be the *proponent* and the party disputing its authenticity is known as the *contestant*. If the will, after the witnesses have testified, is not admitted to probate, the judge is said to pronounce the sentence of *intestacy*. In England the custody of the estates of deceased persons formerly vested in the ordinaries, or the bishops of dioceses, except the rights of the crown or of lords in respect to certain manors, but the act of 1857 abolished the ecclesiastical jurisdiction and con-

ferred full and exclusive authority over all testamentary causes to the court of probate.

PROBUS (prō'būs), **Marcus Aurelius**, emperor of Rome, born in Sirmium, in Pannonia, about 232; died in 282 A. D. The brilliancy of his military achievements caused Emperor Valerian to raise him to the rank of tribune long before the regular age. He commanded in the wars in Africa, Persia, and Germany. Zenobia had conquered Egypt, but he defeated her army and restored it as a Roman possession. Tacitus made him commander in chief of the provinces in the East. In 276, upon the death of the emperor, he was chosen by the army as Emperor of Rome and the senate immediately confirmed the selection. With a large army he invaded Gaul to expel the Germans, who were compelled to retreat across the Rhine. While in Germany he built fortifications at Ratisbon and Neustadt and finally concluded an alliance with the Goths. His administration was eminently successful. While draining the marshes of Sirmium, a mutiny broke out among the soldiers and he was assassinated. Carus succeeded him as emperor.

PROCESS, in law, the whole proceedings in any action, civil or criminal, real or personal, from the beginning to the end. In a more technical sense, the term is applied to different stages of the procedure, such as the terms of the *original process*, which includes the precepts or writs by which one is called into court; the *final process*, or the forms of procedure by which judgment is carried into execution; and the *mesne process*, which covers the proceedings between the other two, embracing all proceedings properly so called, all writs for compelling the attendance of jurors or witnesses, and for other collateral purposes. Mesne and final process are sometimes collectively described by the term *judicial process*, because proceedings in these stages of an action are authorized immediately by the courts, under the hands and seals of their presiding judges. However, in the strict technical sense, process is the means employed for bringing the defendant into court to answer to the action.

The first step in the procedure is to give the defendant *notice* of the issue and pendency of the *original writ*. This notice is given ordinarily by *summons*, informing the party to appear at the return of the writ, and is served upon him by the sheriff, constable, or some other similar officer. The party who brings such an action is known as the *plaintiff*, being the complainant, and the party against whom the action is brought is termed the *defendant*. The suit is commenced after both parties have entered an *appearance* or an appearance is entered for them, when they are said to be *in court*. Each party now makes a statement of the position taken upon the issues of the suit, such as statement comprising the *pleadings*, after which the issue is joined. Questions of law involved in

the cause are determined by the judge, while matters of fact are in most cases decided by the jury. A *verdict* is the decision or conclusion of the jury, while a *judgment* is the decision or sentence pronounced by the court. See **Crime; Courts; Jury; Writ.**

PROCTER (prŏk'tēr), **Adelaide Anne**, poetess, born in London, England, Oct. 30, 1825; died there Feb. 3, 1864. She was a daughter of Bryan W. Procter, secured an education in London, and at an early age devoted much time to poetic writings. Her productions include many works which are still read extensively. They include "Legends and Lyrics" and many poems contributed to *All the Year Round*.

PROCTER, Bryan Waller, poet and prose writer, generally known as *Barry Cornwall*, born in London, England, Nov. 21, 1787; died Oct. 4, 1874. He studied at a boarding school and later became a classmate with Lord Byron and Sir Robert Peel at Harrow. In 1807 he entered upon a course of legal studies in London and contributed to the *Literary Gazette*. The death of his father, in 1816, brought him into possession of a small estate, and until 1820 he devoted his time largely to soliciting, but in the latter year he began writing under the pseudonym of Barry Cornwall. He was admitted to the bar in 1831 and became commissioner of lunacy the following year, which position he filled successfully until his resignation in 1861. Procter does not hold the highest rank among the writers of his time, but was particularly successful as author of many excellent songs and a number of tragedies. His writings of special note include "English Songs," "A Sicilian Story," "Flood of Thessaly," "Dramatic Scenes," "Memoir of Kean," "Marcian Colonna," and "Memoir of Charles Lamb."

PROCTOR, Henry A., soldier, born in Wales in 1787; died in Liverpool, England, in 1859. He came to America at the beginning of the War of 1812, when he held the rank of a colonel. Sir Isaac Brock sent him with a force to Amherstburg to prevent Gen. William Hull from landing. On Aug. 5, 1812, he defeated the Americans at Brownstown, thereby contributing much to the fall of Detroit. In 1813 he defeated the Americans near Frenchtown, on the Raisin River, for which service he was promoted to the rank of brigadier general. General Harrison expelled him from Fort Meigs and defeated him in the Battle of the Thames on Oct. 5, 1813. The authorities tried him by court-martial and he was suspended from service, but was later reinstated.

PROCTOR, Richard Anthony, noted astronomer, born in Chelsea, England, March 23, 1837; died in New York City, Sept. 12, 1888. He graduated from Cambridge in 1860, became a fellow of the Royal Astronomical Society in 1866, and received a fellowship in the London King's College in 1873. In 1873 he made a lecturing tour of America. After observing the

transits of Venus in 1874 and 1882, he published many valuable illustrated articles on stars. Proctor was not only a pleasing and popular lecturer, but an efficient and attractive writer. His writings cover numerous topics in relation to astronomy and extensive travels in America, Southern Europe, and Australia. His death resulted from yellow fever contracted while in Florida. A monument in the form of an observatory was erected to his memory near San Diego, Cal., in 1890. Among his best known works are "Other Worlds than Ours," "Great Pyramids," "Myths and Marvels of Astronomy," "Light Science for Leisure Hours," "Saturn and Its System," "Half Hours with the Telescope," "Old and New Astronomy," and "Orbs Around Us."

PROFIT (prŏf'it), the portion of the joint product of labor and capital which belongs to the employer. The employer may be and often is a capitalist, but he is not always necessarily the owner of the capital employed in commercial or industrial enterprises. Both capital and labor are within themselves helpless, since it is necessary to have an employer or business man to effect a union and put both in successful operation. If a large capital and many laborers are employed, it requires much ability to organize and manage a business. The profits of the employer usually depend upon the ability to manage, and, since they are generally proportioned to the volume transacted, large profits imply an increase and not a diminution of wages. Risk and uncertainty are attached to all business enterprises and the greater the elements of uncertainty the larger should be the profits. In general the profits are small upon single commodities, but they are usually quite large in cases where protection from close competition is provided through patents and copyrights, or where the output of an important product is controlled by large interests so as to create a monopoly.

Profits are classed as gross and net. *Gross profit* is that resulting from the difference between the original cost and the selling price, while *net profit* is what is left after deducting all charges. The proportion which the total profit bears to the capital employed is reckoned on a per cent. basis and is called the *rate of profit*. The gain or loss in business is termed *profit and loss*. These items are made a matter of record in bookkeeping, the former being placed on the credit and the latter on the debit side of the ledger.

PROGRESSION (prŏ-grĕsh'ŭn), in mathematics, a succession of numbers, each derived from the preceding, according to a fixed law. The numbers which form a series are called *terms*. If the terms increase toward the right, they form an *ascending series*; if they decrease toward the left, the series is said to be *descending*. The first and last terms are the *extremes*. An arithmetical progression is a series whose

terms increase or decrease by the addition or subtraction of a fixed number called the *common difference*, as 3, 5, 7, or 12, 10, 8, in which the common difference is 2. A geometrical progression is a series in which each term is formed by multiplying the previous one by a fixed number called the *common ratio*, as 3, 9, 27, 81, in which the common ratio is 3.

PROHIBITION PARTY (prō-hĩ-bĩsh'ŭn), a political organization of the United States, first established as a national organization in Chicago on Sept. 1, 1869. The prohibition movement in the United States dates from 1812, and the first law providing for the prohibition of the liquor traffic was enacted in Maine about 1851. Vermont and Rhode Island passed a similar law in 1852, Connecticut followed in 1854, and the states of New Hampshire, New York, Michigan, and Iowa enacted such laws in 1855. These laws were more or less modified or repealed, but the movement continued to gain many adherents. James Black of Pennsylvania was nominated for President in 1872. He received 5,608 votes and was the first presidential candidate of the Prohibition party. Green Clay Smith received 9,522 votes for President in 1876; Neal Dow, 10,305 votes in 1880; John P. Saint John, 150,369 votes in 1884; Clinton B. Fisk, 250,290 votes in 1888; and John Bidwell, 279,191 votes in 1892.

The party was divided on the money question in 1896, the two opposing factions being known as the Prohibition party and the National party. The former made prohibition the single issue and its candidate for President, Joshua Levering, received 130,560 votes, while the latter supported prohibition, bimetallism, and other issues under the leadership of Charles E. Bentley, who received 14,392 votes. In 1900 John G. Woolley was the candidate for President, receiving 207,368 votes. Silas C. Swallow was the candidate in 1904, when the party polled 258,537 votes. Eugene W. Chafin was the Presidential nominee in 1908, receiving 250,481 votes. Chafin was again nominated in 1912 and received 208,923 of the popular votes. J. Frank Hanley of Indiana was the candidate for President in 1916 and received 220,506 votes. The Prohibition party, though not large as a distinct organization, has had a wide influence for temperance and in making prohibition a national measure.

PROMETHEUS (prō-mē'thē-ŭs), in Greek legends, the son of Iapetus, brother of Atlas and of Epimetheus, and father of Deucalion. Hesiod, the oldest of Greek poets, relates that Prometheus was a Titan and that he formed man out of clay, into whom Athene breathed the spirit of life. He was pleased with the being thus formed and taught him astronomy, the alphabet, mathematics, and a number of the arts. Zeus denied mankind the gift of fire, but Prometheus brought sparks from the chariot of the sun and gave that necessary element to man. This so aroused the anger of Zeus that

he determined to be revenged, first on mankind, and then on Prometheus. He accordingly instructed Vulcan to mold a beautiful woman out of clay, determining that through her trouble and misery would be brought into the world, but, when Vulcan had completed his work, Zeus found her so beautiful that he endowed her with many special gifts. However, Prometheus was chained by Vulcan to a rock of the Caucasus, where a vulture fed upon his liver by day, though Zeus permitted it to grow anew every night. At length Hercules was moved to destroy the vulture and unlock the chains, and Prometheus was permitted to return to Olympus. The story of Prometheus has entered largely into sculpture and literature, the most notable productions of the latter being "Prometheus Bound," by Aeschylus, and "Prometheus Unbound," by Shelley.

PROMISSORY NOTE (prŏm'is-sŏ-rŷ), a promise in writing to pay a certain sum of money, either on demand or at a fixed future time. When the promise is to pay it to the payee or his order, the note is negotiable. It is signed by the maker, who is termed the *payer*. A note may be sold or transferred either with or without recourse on the payee. In the former case he merely signs his name on the back, when it is said to be *endorsed*, but to hold him liable in some states it is necessary to protest the note. Those who sell or transfer a note without assuming any responsibility write their name under the phrase, *Without recourse*. Below is the usual form of a negotiable promissory note:

\$680.00

Philadelphia, Pa., Oct. 10, 1909.

Three months after date, for value received, I promise to pay John Doe, or order, six hundred eighty and 00/100 dollars, with interest at the rate of six per cent. per annum.

Gottlieb Doe.

PRONGHORN (prŏng'hŏrn), a small goat antelope native to the western part of North America, known as *cabree* by the French Canadians and as antelope in the United States. In some localities it is known as prongbuck. Formerly these animals were very numerous in the region lying west of the Missouri, extending from Mexico to the Saskatchewan River, but extensive settlements have reduced their range very materially. The adult is three feet high at the shoulders and about four and a half feet long, and the body is shaped like that of the deer. Small herds frequent the open plains and one of the number usually stands as monitor on an elevated point. The horns are spike-like, about one foot in length, and are replaced each spring by a new growth. A rudimentary form of horns are borne by the female, but they are not noticeable except at close contact. The flesh is of a fine flavor and highly nutritious.

PRONOUN (prŏ'noun), in grammar, a word

used instead of a noun, as *I, we, you, his, themselves*. The properties are *gender, person, number, and case*, all of which are the same as that of its antecedent, except its case, which depends upon the construction of the clause in which it is found. Pronouns are either *personal, possessive, relative, or interrogative*. *I, he, and you* are personal; *his, her, and their* are possessive; *what, which, and who* are relative; and *what, which and who*, are interrogative pronouns. To these are sometimes added *indefinite pronouns*, as *any, much, and some*. Such words as *that, this, and these* are termed *demonstrative pronouns*.

PROOF READING, the art of reading proof sheets made in printing and indicating the necessary corrections by means of particular signs or marks. In printing it is necessary to take a rough impression from type, after the compositor has set an article, or part of an article, for the purpose of noting errors to be corrected. This is necessary in order to secure correctness in spelling, punctuation, capitalization, paragraphs, pages, chapters, etc. It is not customary to read proof sheets of matters published in newspapers more than two times, but in bookwork from three to five readings are common. The first impression taken is called the *first proof* and is corrected by the compositor or manager of the printing office. This is used as a guide in making corrections in the type and a *second* or *clean proof* is made to be examined by the editor, who notes any alterations desired and instructs finally as to the printing.

In the case of composing for books a proof is taken after the page is made up, called a *page proof*, and later a *foundry proof* is taken to verify the work done in electrotyping. These proofs are read by one or more persons, and usually also by the editor or author, all exercising care that the matter is properly noted and marked for revision. Proof reading is a difficult art and requires remarkable care and ability to note all the matters demanding attention in an article or a part of it. It is not sufficient to examine every sentence, but every word and letter must be carefully observed, that nothing inaccurate may pass into print.

PROPHETS (prŏf'ets), those who speak as the inspired representatives of the Divine Being, who are mentioned in the Scriptures as teachers sent by God to utter predictions of future events. The first mention made of prophets occurs in Genesis, where Abraham is spoken of in that relation, and it is implied that Moses was one. However, the more typical prophets began with Samuel, who was likewise a civil ruler, but the prophetic order did not fully develop until the separation of the Israelites into two kingdoms. It is thought that the order of prophets partook of the nature of a school and that young men of the different tribes were admitted into membership, who re-

ceived instruction in sacred poetry, music, and law. Judah, being generally faithful to Jehovah, did not develop many prophets, but in Israel the prophets were prominent and influential, and devoted much time and energy to opposing apostasy and moral depravity. Elijah and Elisha were among the early prophets who left no written works, but the later prophets committed their messages to writing.

Sixteen prophets of the later period of the Old Testament left books that became recognized as a part of the Old Testament canon. They are divided into the four greater and the twelve lesser prophets. The *four greater prophets* are Isaiah, Jeremiah, Ezekiel, and Daniel, whose books precede the others in the order named. The *twelve lesser prophets* are Hosea, Joel, Amos, Obadiah, Jonah, Micah, Nahum, Habakkuk, Zephaniah, Haggai, Zechariah, and Malachi. Hosea, Amos, and Jonah belong to the kingdom of Israel as distinct from the kingdom of Judah; Joel, Isaiah, Jeremiah, Obadiah, Micah, Nahum, Habakkuk, and Zephaniah belong to the kingdom of Judah; Ezekiel and Daniel, to the period of captivity; and Haggai, Zechariah, and Malachi, to the period after the return from captivity. Some of the prophets are mentioned as being particularly skilled in using the psaltery, harp, cymbal, and pipe. The higher classes of prophets had inferior prophets to attend upon them and look after their means of subsistence. Many of them were married and had families, including Moses, Hosea, and Isaiah. The wife of Isaiah is spoken of as a prophetess.

PROPORTION (prŏ-pŏr'shŭn), in mathematics, the relation of one quantity to another. This relation may be expressed by the difference of the quantities or by their quotient. In the former case it is called *arithmetical relation*, in the latter, *geometrical proportion*. The measure of geometrical proportion is called the ratio; that is to say, ratio is the number of times one quantity contains another taken as a standard. Proportion is sometimes called the *rule of three*, since the fourth term may be found when the other three terms are given. In the arithmetical proportion, 3:6::12:24, it will be seen that the ratio of 3 to 6 is the same as that of 12 to 24, and, knowing any three of the given term, it is apparent that the fourth can be found. In the algebraic expression, a:b::c:d, is indicated that the ratio of a to b is the same as the ratio of c to d. All the figures or letters of a complete expression are called the *terms* of the proportion, while the first and last terms are its *extremes* and the intermediate terms are the *means*. In the above expression a, b, c, and d are the *terms*; a and d, the *extremes*; b and c, the *means*; a and c, the *antecedents*; b and d, the *consequents*.

PROSE, the ordinary language used in speaking or writing, distinguished from poetry, which is cast in poetical measure or rhythm.

Classical prose, though known less extensively than classical poetry, may be considered the most important department of literature. Although a large majority of the dull and commonplace discourses are in prose, it must be admitted that a large proportion of the artistic and finished writings are likewise in the prosaic form. See **Essay**.

PROSERPINA (prös'ēr-pī-nä), a Greek goddess, daughter of Zeus and Demeter, who was usually called *Persephone* by the Greeks. It is related that she was gathering flowers in a meadow of Sicily, when a yawning abyss opened at her feet, and she was carried by Pluto to the gloomy realms over which he reigned. When Demeter became conscious of her loss, she was stricken with intense grief and wandered nine days and nights without tidings from her child. On the tenth day she learned by consulting Helios that Pluto had carried her daughter to the under world, and, after imploring him with great fervor, it was agreed that Proserpina should spend one-half of every year with her mother and the heavenly gods and pass the rest of the year with Pluto beneath the earth. Writers have spoken of this legend as indicating the planting of seeds in the earth, which, after about nine days, send the tender plants forth, while the matured seeds remain about one-half year in the granary.

PROTAGORAS (prō-täg'ō-rās), Greek philosopher, born in Abdera, in Thrace, about 481 B. C.; died about 411. He was a contemporary of Socrates and was the first to assume the title of *Sophist*. He admonished to educational effort and taught that the measure of all things is to be found in man. All his works are lost. Some were burned at Athens before his death, and he was banished on a charge of being an atheist. It is thought his death occurred at sea while proceeding to Sicily. His chief work is a treatise entitled "On the Gods."

PROTECTION (prō-těk'shŭn), an economic theory by which governments seek to limit imports for the benefit of home manufacturers. The principle of protection was recognized distinctly by the first tariff levied in the United States, in 1789, though the amount of protection was moderate. It has been the policy of the government to combine a protective tariff tax with the plan of internal improvements at national expense, and such a policy has been sustained during all its history, except in the period from the establishment of the Walker tariff in 1846 to that of the Morrill tariff in 1861.

Writers on political economy are much divided as to the practical effect of a protective tariff. It is claimed on the one hand that it is absolutely necessary to protect home industry to enable the producers of a protected article to receive in return for their services a fair remuneration. Those taking the opposite view assert that the uniform effect of the policy is to render the article produced both dear and bad.

Tariff duties are usually of two classes—protective and prohibitory. A *protective tariff* aims to provide conditions under which articles of foreign and home manufacture can compete in the market on terms nearly equal, while a *prohibitory tariff* has the effect of excluding foreign products from the market.

The protective system was first proposed on a large scale by an Italian in the suite of Catherine de' Medici and soon after legislation developed whereby retaliatory tariffs were levied in a number of countries, as the tariff of England in 1692, which taxed the goods imported from France on an average about 75 per cent. In the period between 1818 and 1824 all bounties to manufacturers were abolished in Britain, and this, with the repeal of the corn and navigation laws, ended the protective policy in that country. In the United States a large proportion of the people still favor a protective policy, although a considerable minority is in favor of free trade. See **Tariff**; **Free Trade**, etc.

PROTECTOR (prō-těkt'ēr), the official title of one appointed in England as a regent of the kingdom during the minority or incapacity of the sovereign. The Earl of Pembroke was among the first protectors, serving in 1216 during the minority of Henry III. Oliver Cromwell assumed the title of Lord Protector in 1653 over England, Ireland, and Scotland, serving until 1658, and was succeeded in that capacity by Richard Cromwell.

PROTEIDS (prō'tě-īdz), the name of several important animal and vegetable compounds, some of which are found in solutions or viscous solids in nearly all animal and vegetable organisms. They are formed exclusively in plants and undergo but slight alteration when consumed as food and stored up by animals. However, man derives the proteids, or nitrogenous, foodstuffs principally from grains, vegetables, eggs and milk, and the flesh of animals, birds, and fishes. The constituents of proteids are similar to those of protein, containing carbon, hydrogen, nitrogen, oxygen, and sulphur.

PROTEIN (prō'tě-īn), the name of certain chemical substances which occur in the organism of plants and animals. They are composed principally of oxygen, carbon, nitrogen, and hydrogen. These substances are important as food, serving to furnish heat and to repair and build up the body. The proteins are classified, not according to their chemical composition, but according to their physical properties and their action upon certain reagents. They include the foods known as proteids and nonproteids, of which the former, or albuminoids, are the most important. The albuminoids, known as *true proteids*, are exemplified in the gluten of wheat, the albumin of eggs, and the casein of milk.

PROTESILAUS (prō-tēs-ī-lā'ūs), King of Phylace, in Thessaly, son of Jason. It is related in the *Iliad* that he was the first who leaped from the ships upon the shore of Troy, and

Lucian says that he was killed by Hector, being the first Greek to fall in the Trojan War. The affection between Protesilaus and his wife Laodamia is celebrated by the poets. After his death she prayed to be permitted to converse with him for the space of three hours. This prayer was granted and he was conducted from the lower world by Mercury, but when he returned his wife killed herself and accompanied her husband.

PROTESTANTS (prōt'ēs-tānts), the designation applied to Christians who deny the authority of the Pope and hold to the right of private judgment in the matter of religion. The name was first applied to the princes and other adherents of Luther, who, at the second council of Spire, held on April 19, 1529, protested against the decree of the majority, representing the Roman Catholic states of Europe. This decree involved a virtual submission of the reformers, who not only dissented from the decree, but appealed to a general council. Among the leading princes who followed the leadership of Luther were Landgrave Philip of Hesse, the Electors George of Brandenburg and John of Saxony, Prince Wolfgang of Anhalt, and Princes Ernest and Francis of Brunswick-Lüneburg. Many imperial cities joined the movement under Luther. They were Ulm, Strassburg, Nuremberg, Constance, and ten others.

The Protestant churches include the denominations which are not Roman and Greek Catholic, embracing the Lutheran, Presbyterian, Methodist, and other ecclesiastical bodies, though several branches of the Anglican Church do not accept the classification as historically correct when applied to them. Among the fundamental doctrines of Protestantism are the supremacy of the Bible above bishops and councils, individual responsibility, justification by faith, and freedom within the authority of the Bible of conscience and worship. The branches of the Protestant Church are more or less widely distributed, though the Teutonic peoples of Northern Europe and their descendants have had and still make up the largest membership. It has been difficult for Protestantism to make material advances among the Latin peoples of Southern Europe and their descendants. The Protestant churches of the world have a membership of 163,300,000.

PROTEUS (prō'tē-ūs), the Greek sea myth known as "The Old Man of the Sea," regarded a son of Neptune. He is represented as a marine deity, who tended the flocks of seal at the bottom of the sea, but at the hour of noon came up to the island of Pharos, on the Egyptian coast. It was his custom to slumber beneath the grateful shade of the rocks while surrounded by flocks of seals, and his coming was awaited with interest, since he possessed the gift of prophecy. Those consulting him were obliged to hold him in their embrace, as he endeavored to escape, and for that purpose

changed himself into various hideous forms and objects. When at last wearied from effort to escape, he foretold future events and again dived to the bottom of the sea, accompanied by the animals he tended.

PROTOPLASM (prō'tō-plāz'm), the elementary living matter of plant and animal structures. Its chemical constituents are about eighty per cent. of water and about twenty per cent. of solids, chiefly proteids. The proteids found in protoplasm consist mainly of peptones, albumoses, and globulins, with small quantities of salt, fat, and carbohydrates. All organized bodies contain protoplasm. It is seen in its simplest form in the lowest animals, as in the protozoa. Protoplasm is transparent and can absorb, excrete, secrete, grow, move, and multiply. It is not elaborated from minerals by animals, but they derive it from plants or other animals by converting the dead into living protoplasm. However, plants derive it from the air and mineral substances, thus providing a supply of this essential substance for the use of animals. Huxley spoke of protoplasm as the physical basis of life, since it seems to be the original life principle, and is found in all organized bodies.

PROTOZOA (prō-tō-zō'ā), one of the subdivisions of the animal kingdom. It is a division of the invertebrate animals, embracing those that have a simple structureless organism, reducible to a cell or cell contents, without any distinct separation of system or organs. Cuvier and Agassiz include the vertebrates, articulates, mollusks, and radiates among the distinct divisions of the animal kingdom, while others add a fifth branch, the protozoa. However, the last mentioned, as formulated by some writers, includes forms of life that are now known to be plants and others are embryonic forms of crustaceans, mollusks, and worms. As generally defined, the protozoa includes the foraminifera, rhizopods, and some of the infusoria. All the animals belonging to this division are minute and but few can be seen without the microscope. While a few live in moist earth or as parasites on or in other living organisms, the larger number are found in fresh and salt waters. The food is taken into the protoplasm, the name applied to their nearly structureless substance, either by a specialized mouth, or by any part of the cell substance, in the form of particles. As a rule they are incapable of assimilating nitrogen, since their cells consist largely of nitrates or carbonates. Reproduction is usually by spore formation, fission, or gemmation. Sponges belong to the protozoa and constitute the largest form. An infusore is said to be the cause of hay fever and other diseases, but many species are important in that they act as scavengers. Extensive beds of rocks have been built up by the skeletons of these animals.

PROTOZOIC ERA. See **Geology**.

PROUDHON (prō-dôn'). **Pierre Joseph,**

political and economical writer, born at Besançon, France, July 15, 1809; died in Paris, France, Jan. 19, 1865. He was the son of a cooper and received the rudiments of an education at the college in his native town, and in 1828 entered a printing office as proof reader. While in this position he acquired considerable ability as a linguist, and published a work on French grammar of such merit that he was awarded a pension by the Academy of Besançon. In 1840 he published a work on political economy, in which he advanced many radical theories and treated property as the result of theft. This and other similar works caused him to be prosecuted, but he was ultimately acquitted. From 1843 to 1847 he superintended a water transport system at Lyons on the Saone and Rhone rivers. He settled in Paris in the latter year, and became a leader of the Revolution of 1848 by publishing an aggressive journal devoted to extreme democracy and socialism. His paper was suppressed by the government, but he was chosen by a large vote as a representative from the department of the Seine in the constituent assembly. The extremely radical views expressed by him caused a majority of the members to seek to suppress his addresses in rendering them inaudible and ineffective by making disturbances. However, he reached the masses by publishing three daily papers in Paris, and in 1849 was imprisoned on a three years' sentence on the charge of inciting insurrections. In 1852 he attained his liberty and settled in Belgium, where he continued publishing addresses and works on political and economical reforms. Though radical, Proudhon was influential as a writer and speaker, and his fines and much of his expense were defrayed by popular subscription.

PROVENÇAL (prô-vän-säl'), the name used to designate the different Romanic dialects formerly spoken and written in the south of France, which are employed at present by country people in the région included in the former province of Provence. Collectively they are classed as one of the six chief Romance or neo-Latin languages and sometimes as a dialect of French. Provençal is inflected more than the other dialects of its class and was the first to be fixed grammatically. The earliest writings in the Provençal language date from the 9th century, and in the 11th and 12th centuries its literature spread over a large portion of southern France and into northern Italy and Spain. Its widest use and highest development were reached in the later part of the 12th century. The highly inflectional properties make it particularly adaptable to the production of poetic forms, though in modern times it is more simply inflected than in the ancient, and a considerable number of French words and terms have been incorporated with it. Provençal literature was revived notably in the 19th century.

PROVERBS (pröv'ërbz), the wisdom of experience condensed into brief and pithy sayings. Many definitions have been applied by numerous writers and much energy has been devoted to forming and collecting proverbs from the different races and ages. Aristotle spoke of proverbs as remnants that were saved from the ruins of ancient philosophy on account of their shortness. Agricola considered them short sentences into which the ancients compressed life, Erasmus regarded them as well-known forms framed from somewhat uncommon sayings, and Bacon defined them as the genius, wit, and spirit of a nation. Sayings that contain wit and truth, but are applicable only in one line of conversation or to illustrate a specific idea, are not properly proverbs, since a proverb must be a saying that has long been in general use and has been accepted by the people. As a rule a proverb originates of its own accord by the sense and method contained in it, and usually reflects the people with whom it originated. Thus a proverb does not originate from any one individual, but springs into use by popular approval, and ultimately passes from nation to nation until it becomes the heritage of the race. Many of the proverbs in general use are of very early origin, some of them coming from Arabia and Persia, though as a rule it is quite difficult to determine whence the best and most popular proverbs now in use first sprang into existence.

The first collection of Arabic proverbs dates from the 11th century, and different nations have made similar collections and adopted many of those drawn from other sources. It may be said that the Spanish people have the largest number of proverbs, estimated at about 25,000. The literature of Iceland is rich in proverbs and so is that of the German and Scandinavian languages. The Arabs have the largest number of proverbs of Asiatic nations, but those of Persia, Hindustan, and Turkey are likewise numerous. Such proverbs as "Time is money," "God tempers the wind to the shorn lamb," "Hit the nail on the head," "Strike while the iron is hot," "Put the matter in a nutshell," and many others are practically in universal use. The *Book of Proverbs* is a part of the Bible and contains a collection of popular sayings, but the book is not constituted exclusively of proverbs. It is generally attributed to Solomon, though many of the sayings do not appear to be founded solely on his own experience, but rest at least partly on the shrewd observation of the nation at large. It includes many sayings that were coined in earlier times. Many of the proverbs drawn from this book are in popular use, and the New Testament in many instances quotes directly from it.

PROVIDENCE (pröv'i-dens), the capital of Rhode Island, county seat of Providence County, 42 miles southwest of Boston, Mass. It is located on the Providence River, an arm of

Narragansett Bay, and has communication by the New York, New Haven and Hartford and other railways. The site includes about 20 square miles, being located on both sides of the Providence River, and the eastern limits extend to the Seekonk River. An undulating and somewhat hilly surface is in the eastern part, while the west side is a somewhat sandy plain. Beautiful sites for residences are plentiful in the higher section, where the elevations reach about 200 feet. Along the river and bay is a considerable tract that has been made by grading, and here are some of the largest and most substantial business houses.

All parts of the city are regularly platted, but some of the thoroughfares in the older part are narrow and crooked. Nearly 250 miles of streets are covered with pavements, constructed largely of stone and macadam. Boulevards extend through the residential portion and to Roger Williams Park, which consists of 540 acres. It has a fine statue of Roger Williams, zoölogical gardens, and artificial lakes. Near the city hall is a statue of General Burnside and in front of this building is the Soldiers' and Sailors' Monument. The State capitol, a massive structure of marble and granite, was completed in 1900. Other prominent buildings include the city hall, the post office and Federal building, the county courthouse, and the union railway depot. Providence has many large business and office buildings, such as the Barton Block, the National Exchange Bank, the Athenaeum, and the Equitable, Bannington, and Industrial Trust buildings.

The city has a well-organized system of public schools, ranging from the kindergarten to the high school. It is the seat of a State normal school, the Rhode Island School, and the Rhode Island School of Design. In its public library are 92,500 volumes. Brown University, located on the east side, has a large and well-selected library. Other extensive collections include those of the State, the Young Men's Christian Association, and the Providence Athenaeum. Many charitable institutions are maintained, including the Rhode Island hospital, the State institute for the deaf, and Dexter Asylum for the poor. The Friends' School, founded in 1818, is celebrated as a center of learning. All the leading Christian denominations have fine churches. They include the Central Baptist, the Saint Stephen's Episcopal, the First Universalist, the Roman Catholic Cathedral of Saint Peter and Saint Paul, the Trinity Methodist, the Grace Episcopal, and the Union Congregational.

Providence ranks as the second commercial city of New England, being exceeded only by Boston. It is a port of entry and has an extensive harbor. Although the larger part of the trade is domestic and coastwise, it handles a large volume of foreign commerce. As a wholesale and jobbing center it takes high rank and carries a large business in coal, grain, live stock,

and manufactures. In the output of jewelry it holds a high place among the cities of the United States. Silverware, files, screws, cotton and woolen goods, engines and boilers, and machinery are produced extensively. It is a slaughtering and meat-packing center and has large interests in dyeing and finishing textiles. Other products include malt liquors, rubber and elastic goods, boots and shoes, firearms, and tobacco products.

Communication within the city is by an extensive system of electric railways, from which branch lines extend to suburban and interurban points. Municipal lighting is by gas and electricity. It has an extensive system of waterworks and well-organized police and fire departments. The city is located on a tract of land which was settled by Roger Williams in 1636. He established the first Baptist church organized in America, separated the temporal from the spiritual affairs, and extended religious toleration to all. During the Revolutionary War the city suffered considerably, but it became more prosperous after the War of 1812. In 1832 it was chartered as a city. At present it ranks among the wealthiest and most prosperous cities in the United States. Population, 1920, 237,506.

PROVO CITY (prō'vō), a city in Utah, county seat of Utah County, on the Provo River, about 45 miles south of Salt Lake City. It is on the Rio Grande Western and the Oregon Short Line railroads. The noteworthy buildings include the Brigham Young Academy, the State Insane Asylum, the Proctor Academy, the public library, and the high school. Utah Lake, Provo Cañon, and Bridal Veil Falls are attractions in the vicinity. It is surrounded by a fertile farming region and has a large trade in cereals, live stock, and merchandise. The manufactures include flour, leather, machinery, and woolen goods. Electric lights and waterworks are among the municipal facilities, and, being easily accessible by railways, it is a favorite resort for summer tourists. Provo City was settled in 1849 and incorporated in 1851. Population, 1900, 6,185; in 1920, 10,303.

PROWSE, Daniel Woodley, jurist and author, born at Saint John's, Newfoundland, in 1834. He studied at Saint John's and at Liverpool, England, and was admitted to the bar in 1858. For some time he was a member of the Legislature and in 1869 became judge of the central district court. He contributed to many periodicals and works of general reference, including the *Encyclopaedia Britannica*. His books include "History of Newfoundland" and "Manual for Magistrates in Newfoundland."

PRUNES, the dried fruit of any one of several species of the common plum. Prunes are produced extensively in California, Oregon and southern Europe, and are known in the market from the country producing them, as California, Spanish, German, Turkish, and French prunes. They are used extensively as

a food, after being prepared by stewing, and in some countries brandy is distilled from them.

PRUNING, the act of cutting off superfluous branches, shoots, or roots of trees and shrubs for the purpose of bringing the plants to a particular form, or with the view of strengthening the growth of the parts remaining. Many plants throw out unprofitable growths, thus decreasing the production of flowers and fruit, while some assume a form either undesirable or illy calculated to withstand the effect of wind and weather. The ultimate result of judicious pruning is an increase in the vitality of the plant and in the size and quality of its fruit. This result is due to the removal of excessive branches, thus exposing the inner limbs to a greater amount of sunlight and causing a larger quantity of vital sap to flow to the flowers and fruit. In some countries forest trees are pruned with the view of influencing the growth of their trunks as to size and direction, while in flower culture plants are trimmed to increase the size and vigor of their ornamental parts. *Root pruning* is generally effected to increase the beauty and size of flowers. Both classes of pruning depend upon the plants to be improved, since the removal of a large number of roots and branches may impair general growth. Pruning out of season is particularly harmful.

PRUSSIA (prūsh'ä), in German *Preussen*, a government of Europe and the most important state of the German republic. It is situated in the northern part of Germany and is divided into the following thirteen provinces: East Prussia, West Prussia, Brandenburg, Pomerania, Posen, Silesia, Saxony, Schleswig-Holstein, Hanover, Westphalia, Hesse-Nassau, Rhenish Prussia, and Hohenzollern. Silesia is the largest province, area 15,568 square miles, and Hohenzollern is the smallest, area 441 square miles. The total area is 134,548 square miles. Berlin is the capital and largest city. Other cities of importance include Breslau, Cologne, Danzig, Düsseldorf, Frankfurt, Hanover, Königsberg, Magdeburg, Altona, Elberfeld, Barmen, Stettin, Krefeld, Aachen, and Halle.

DESCRIPTION. The western part of Prussia is more or less hilly and mountainous, but the general surface of the vast territory lying toward the north and east is included in the plain stretching from the Ural Mountains to Holland and its surface is quite level or undulating. The general drainage is toward the north into the Baltic Sea and the North Sea. Among the principal rivers are the Weser, Elbe, Oder, and Vistula, all having their source near the southern boundary, while the Nieman flows through the northeastern part and the Rhine through the western part. Other streams include the Eider, Ems, and Pregel. The principal rivers have been improved for navigation by a network of canals and all parts of the kingdom have an adequate railway service. Former-

ly the region was covered by a vast expanse of forests, and about 21 per cent. of the surface is still covered with timber. Indeed, forestry is an important industry, the production of timber being a source of great wealth. Much of the soil is exceedingly fertile, though in some portions marshes and peat moors are extensive, while in others the soil is of a light, sandy formation, as is the case in both East Prussia and West Prussia. The Rhine valley is noted as the most picturesque and fertile part of Germany. It is famous on account of its fine orchards and vineyards.

INDUSTRIES. Farming is one of the leading enterprises and the soil is tilled with much care. Among the leading products are wheat, barley, oats, maize, potatoes, sugar beets, and garden produce. It has a large yield of tobacco, flax, hemp, and domestic animals, particularly horses, cattle, sheep, swine, and poultry. Mining is an important industry, the products including coal, peat, iron, zinc, lead, copper, cobalt, silver, salts, copperas, manganese, and nickel. Among the manufactures are beet-root sugar, tobacco products, cotton and woolen goods, chicory, scientific instruments, machinery, ships and sailing vessels, engines and boilers, and utensils. The railroad and canal trade is of growing importance and its seaports have been noted as centers of commerce for centuries. It has a vast trade in textile fabrics, chemicals, metal wares, leather, glass, coal, stoneware, timber, and live stock. The leading port cities include Stettin, Flensburg, Königsberg, Kolberg, Stralsund, Kiel, and Pillau on the Baltic, and the North Sea port of Altona.

EDUCATIONAL. Prussia is particularly famous on account of its splendid educational institutions. Attendance at all the public elementary schools is compulsory. Education is supported by local and state aid. The period at which children are required to attend ranges from six to fourteen years, and the population within this limit aggregates 6,750,000. Among the noted institutions that have made Prussia famous are the ten universities of Berlin, Halle, Göttingen, Königsberg, Greifswald, Münster, Breslau, Kiel, Bonn, and Marburg. These institutions have about 1,450 professors and teachers and an attendance of 18,500 students. They are uniformly equipped with modern apparatus, museums, and libraries. The Royal Library at Berlin is one of the most famous in the world. Many literary, scientific, and artistic schools and societies are maintained, such as the Academy of Arts, founded in 1699, the Antiquarian Society of Stettin, the Royal Museum of Arts of Berlin, and the Breslau Historical Society.

INHABITANTS. Practically the entire population belongs to the German race, the principal exception being about 400,000 Jews and 150,000 Poles. The original inhabitants, known as the old Prussians, have been absorbed by the Teutonic element. The Poles are confined large-

ly to the eastern part. Population, 1905, 37,293,324; in 1920, 40,163,333.

GOVERNMENT. The government is a constitutional republic and the right of suffrage is in both sexes. The president is assisted by a council of ministers appointed by public decree. It has a legislative assembly called the *Landtag* composed of two chambers, the *Herrenhaus* and the *Abgeordnetenhaus*. The upper chamber has a membership of about 300, including legislators chosen by the different states, while the second chamber includes 443 members chosen by popular suffrage, the membership being based on a ratio of the population in the different provinces of the republic. Prussia was the most potent factor in the German Empire. The King of Prussia was the Emperor of Germany and his chief ministers of state were the same as those chosen for the empire. The army and navy were an integral part of those of Germany, while the representation in the national *Bundesrath* was numerically the the largest. It had 17 members in that body, and 236 deputies in the diet or *Reichstag*.

HISTORY. It is thought that when the Phoenicians visited the North and Baltic seas, in the 4th century B. C., they found Slavonic tribes occupying the region at present comprised in northern Prussia, but little is known of these people until in the 10th century, when they are mentioned by a number of writers as Borussi or Porussi. Their fear of losing independence caused them to battle against the advance of Christianity with marked determination, and in 997 Bishop Adalbert of Prague was martyred by them. The Knights of the Teutonic Order of Saint George entered upon a crusade against them in the middle of the 13th century and formally established the Christian faith. A considerable part of Prussia was governed by the Teutonic Knights under a despotic form until 1466, when their power was overthrown by the allied forces of the Prussians and Poles. At that time West Prussia became a part of Poland and East Prussia was made a Polish fief, but in 1618 the duchy of Prussia was established and John Sigismund, Elector of Brandenburg, became Duke of Prussia, and since that time the government has been vested in the Hohenzollern-Brandenburg dynasty.

Prussia was a noted seat of action in the revival of learning and the center of activity in the Reformation. It was connected more or less prominently with the early German Empire that included Austria and Italy, and took a large part in the contests that led to the overthrow of Napoleon in 1815. The larger importance of Prussia in modern times dates from 1866, when it undertook an aggressive movement against the power of Austria, which not only consolidated many of the German states with Prussia, but resulted in the organization of the German Empire after the Franco-German War of 1870-71, the Prussian king assum-

ing the title of Emperor of Germany. See **Germany**.

PRUSSIC ACID (prūs'sīk), a colorless liquid discovered by Scheele in 1783, known scientifically as hydrocyanic acid or cyanide of hydrogen. It has a specific gravity of .7, boils at 80°, and solidifies at 5°, forming feathery crystals. Prussic acid is obtained from many sources, including the kernel of the bitter almond and the fruits of the peach and apricot families. It is derived from the leaves of the cherry, laurel, and peach and from different parts of various plants. A weak solution of prussic acid is useful in treating bronchitis and affections of the mucous membrane, but, when administered in excessive doses, it acts as a dangerous poison and death results quickly.

PRUTH (prōōth), a tributary of the Danube River, rising near the boundary of Galicia and Hungary, on the northeastern side of the Carpathian Mountains. After a course of about 500 miles toward the southeast it joins the Danube at Galatz. It forms the boundary between Rumania and Russia, has a deep valley, and is navigable to Jassy.

PSALMS (sāmz), **Book of**, a book of the Old Testament, containing the songs of praise used by the Jews in their worship in the temple. It contains 150 psalms, or sacred lyrics, and was arranged by the Hebrews in five books, each having a particular superscription and terminating with a doxology. It is evident that the book was brought together from many sources and that its composition and compilation extended over many centuries. Some writers have assigned it almost entirely to David, but others think that Solomon wrote a number of the psalms. It is certain that some of them were not written until after the Babylonian captivity, and still others in the time of the Maccabees. About seventy allusions were made to the Psalms by Jesus and his apostles.

PRZEMYSL (pzhēm'īsl), a city of Austria-Hungary, in Galicia, on the San River, 50 miles southwest of Lemberg. It is a railway and trade center. The Russians captured it in March, 1915, but lost it soon after. Population, 1914, 57,862.

PSEUDONYMS (sū'dō-nīmz), the fictitious names assumed by writers to conceal their identity. They are frequently called *nom de plumes*. The practice of publishing books and magazine articles under a false name originated with persons who wanted to induce people to believe them the works of those whose names they bore, and because the writers did not care to be spoken of in connection with their publications. Many young authors have become connected with pseudonymous names for the reason that they did not wish to risk revealing their identity, and later the assumed names clung to them and became more widely known than their real names. This is particularly true of such writers as Marian Evans and D. R.

Locke, who are better known by their respective pseudonyms, *George Eliot* and *Petroleum V. Nasby*. The following is an abbreviated list of pseudonyms adopted by famous authors:

Adeler, Max.....	Charles Heber Clark.
Atlas.....	Edmund Yates.
Bab.....	W. S. Gilbert.
Bell, Acton.....	Anne Brontë.
Bell, Currer.....	Charlotte Brontë.
Bell, Ellis.....	Emily Jane Brontë.
Bickerstaff, Isaac.....	Dean Swift.
Biglow, Hosea.....	James Russell Lowell.
Billings, Josh.....	Henry W. Shaw.
Blouet, Paul.....	Max O'Rell.
Boz.....	Charles Dickens.
Breitmann, Hans.....	Chas. G. Leland.
Bystander.....	Goldwin Smith.
Carmen Sylva.....	Queen of Rumania.
Caxton, Pisistratus.....	Lord Lytton (First).
Crayon, Geoffrey.....	Washington Irving.
Creyton, Paul.....	J. T. Trowbridge.
Elia.....	Charles Lamb.
Eliot, George.....	Marian Cross Evans.
Fern, Fanny.....	Sara P. Parton.
Graduate of Oxford.....	John Ruskin.
Greenwood, Grace.....	Mrs. S. J. Lippincott.
H. H.....	Helen Hunt Jackson.
Hamilton, Gail.....	Mary Abigail Dodge.
Harland, Marion.....	Mrs. M. V. Terhune.
Ian Maclaren.....	John Watson.
Ik Marvel.....	D. G. Mitchell.
Jean Paul.....	J. P. F. Richter.
Johnson, Benj. F.....	James Whitcomb Riley.
Kerr, Orpheus C.....	R. H. Newell.
Knickerbocker, Diedrich.....	Washington Irving.
Lyall, Edna.....	Ada Ellen Bayly.
Meredith, Owen.....	Earl of Lytton.
Miller, Joaquin.....	C. H. Miller.
Nasby, Petroleum V.....	D. R. Locke.
North, Christopher.....	John Wilson.
Nye, Bill.....	Edgar Wilson Nye.
Opium Eater.....	T. de Quincey.
Optic, Oliver.....	W. T. Adams.
Ouida.....	Louise de la Ramée.
Paolo, Frà.....	Paolo Sarpi.
Pindar, Peter.....	John Wolcott.
Quad, M.....	C. B. Lewis.
Rob Roy.....	John Macgregor.
Sand, George.....	Madame Dudevant.
Shirley.....	John Skelton.
Slick, Sam.....	T. C. Haliburton.
Titcomb, Timothy.....	J. G. Holland.
Titmarsh, Michael Angelo.....	W. M. Thackeray.
Twain, Mark.....	Samuel L. Clemens.
Uncle Remus.....	Joel Chandler Harris.
Ward, Artemus.....	Charles F. Browne.
Wetherell, Elizabeth.....	Susan Warner.

PSYCHE (sī'kě), in Greek mythology, the youngest of three princesses, whose beauty excited the jealousy of Venus and so attracted those with whom she came in contact that she was often mistaken for Venus. After observing for some time the popularity of Psyche, Venus sent Cupid, or Love, to inspire her with admiration for the most contemptible objects. However, Cupid himself soon became enamored of her and his passions were fully reciprocated by the maiden. The nightly visits of the two lovers attracted the attention of the two jealous sisters of Psyche, who prevailed upon her to fear that she was in courtship with a monster. Although it had been previously understood that the maiden should not inquire regarding the personal affairs of Cupid, she was so aroused to curiosity that on one occasion she carried a burning lamp to the chamber of her lover, in whom she discovered the handsomest of gods. In the excitement that followed Cupid was awakened from his sleep, only to reprove her for her doubts and vanished from her sight. Soon after Psyche and Venus became fully rec-

onciled, and the two lovers were united in immortal wedlock with the sanction of Jupiter. Writers generally regard the story of Psyche as personifying the human soul in its progress through the afflictions of life until immortal peace is realized.

PSYCHOLOGY (sī-kōl'ō-jy), the science of the human soul, treating the phenomena of its attributes and operations as manifested in connection with the body. The study of this branch of knowledge has been variously designated as mental science, mental philosophy, and metaphysics, though the last stated term in its scope often designates more than psychology, and at other times less. As a science it is to be classed with the inductive group, since its laws are discovered by observation, either through the agency of personal study or by the testimony of others. Although a knowledge of psychology is of much value to all, especially to teachers and professional men, its study is either limited or neglected, largely because it demands close observation, careful reflection, and precision in making discrimination. Besides, there are many differences of opinion regarding divers matters of interest in relation to the nature and operation of the different faculties of the mind. However, the multiplication of text-books and greater interest in professional associations are fast extending study and broadening research.

MENTAL POWERS. Though man is known to be constituted of mind and matter, the nature of neither is definitely understood, and we may study them only by their acts or effects upon each other and upon external things. Both the mind and the body have certain powers, or ability to act and do. The powers relating to the body are known as *physical*, and those pertaining to the mind as *psychical*, both showing close dependence upon each other. All the powers of the mind are grouped in three classes, known respectively as intellect, sensibility, and will. The *intellect* comprises the powers by which we are able to know; the *sensibility*, those by which we feel; and the *will* is the power by which we choose and execute. This division of mental powers does not imply that the mind is composed of organs or parts. On the contrary, it is one indivisible thing. It is the mind as a whole that knows, feels, and wills. There is a close relation between the body and the mind, but the relationship is especially intimate between the mind and the nervous system, particularly the brain. It is not difficult to realize this relationship when we contemplate the effect that a severe physical pain, such as toothache or a wound, has upon the mind, or what influence mental exhaustion exercises on the bodily functions.

CULTURE OF THE INTELLECT. The intellect, being the power to know, cannot be cultivated without bringing the mind in contact with objective realities. An object that has no real existence cannot be known, though psychical ob-

jects are considered as real as the objects of material nature. Among the objects of knowledge are the acts and states of the mind; the product of mental acts, such as concepts and thoughts; and external material objects. Writers generally agree that we can be conscious only of our mental acts and states, that we know only what we can recall into consciousness, and that the degree of consciousness is increased by applying the mind vigorously to the acts or states perceived. The power of self-direction possessed by the mind is called the attention, which varies in degree from a slight energy to an intense concentration of the mind on one object to the exclusion of all others. Attention being under the control of the will, it can be cultivated by the exercise of will power over the movements of the mind. An enlargement of ability to apply attention is followed by greater power of perception. The whole process of acquiring knowledge involves a succession and network of mental activities. These include sensation, discrimination, perception, analysis and synthesis, comparison, judgment, conception, and reasoning.

Sensation comprises the conscious state resulting from the action of some organ of sense under nervous stimuli, and is the first step in acquiring knowledge. *Discrimination* is the discernment of distinctions while the mind is undergoing sensations, thus leading to a *perception*, which may be defined as the power of acquiring immediate and fundamental knowledge. *Analysis* involves a separation of parts into their elements, while *synthesis* implies the combining of several constituents to form wholes. The term *comparison* implies the discernment of likeness and unlikeness between several objects, thus leading to the formation of a primary judgment, and ultimately to conception and reasoning. Though the acquirement of knowledge depends to a large extent upon the power to give attention, the latter is again dependent upon *interest*, which invites and sustains attention, and thus bears directly upon successful study. *Memory* represents to the mind objects previously known, while *imagination* represents objects not as they are or were, but as they may be or might have been. Both are susceptible of training, and by right use constitute elements of vast importance in mental culture.

The powers of the intellect may be subdivided into four groups, namely, the presentative, representative, reflective, and intuitive. By the *presentative powers* we acquire knowledge of the outside world through the five senses—hearing, seeing, tasting, smelling, and feeling—and to these some writers add the sense of muscular resistance. The *representative powers* include memory and imagination, the former involving the two mental acts of reproduction and recognition. The *reflective powers* make it possible for us to establish the relations and connec-

tion of objects, while the *intuitive powers* enable us to know certain fundamental facts intuitively. According to most writers, we acquire at least seven fundamental ideas by intuition. They include the idea of *space, place, being, time, right, cause*, and *personal identity*, each of these being as self-evident as the truth that a part is not equal to the whole, and that a person cannot be in two places at the same time.

SENSIBILITY. Since all feelings are actions or states of the soul, they are classed as psychical. However, those arising in the bodily organism are generally termed corporeal to distinguish them from those originating exclusively in the mind. The *corporeal feelings* include sensations, appetites, and instincts. Sensations arise from some excitement of the nervous system, while appetites are occasioned by the wants of the body, and instincts attend sensations and appetites, but are not governed by a directing intelligence. The *psychical feelings* proper are divided into emotions, affections, and desires. It may be said that all feelings are pleasurable or painful, and that they are induced and extended largely by education and early training.

WILL. The will, being the power of choice and execution, enables us to decide upon our conduct and to put forth the necessary volitions. Both choice and execution are necessary to constitute a completed act of the will. It is man's power to use deliberation in making a choice and to exert force in execution that he stands preëminent above all other creatures. Not what a man knows, or what his feelings may be, count as much in estimating character as the choice of conduct and the execution of his designs. Writers do not agree whether man possesses freedom of the will. Those holding that the will is not free generally agree that education, sensibilities, and environments operate to limit and modify, while those of the opposite school think that man has perfect freedom to choose and unlimited power to put forth volition. The responsibility resting upon those who presume to teach and direct in daily conduct should not be underestimated. It should be their aim to stimulate the power of the will by wise activity and to inculcate promptness in forming decisions. Only when the will is developed in harmony with the intellect and the sensibility can a definite and stable character result. See **Education; Pedagogics.**

PTARMIGAN (tär'mī-gan), the name of several species of grouse, differing from the other birds of the same family in that the legs are densely feathered to the claws and the nasal grooves are covered with feathers. They have sixteen to eighteen feathers of considerable length in the tail. In most of the species the feathers become white in winter. They inhabit the northern and snow-covered regions of both hemispheres, where they feed on mosses, lichens, small fruit, and insects. The plumage harmonizes with the rocky barrens in summer and the

snow in winter, and the plumed feet enable them to walk upon the snow without sinking into it. About June the female incubates, but the male assists in rearing and feeding the young. Both fly rapidly with a whirring noise and are swift runners. The females cackle like a hen, but the males have a loud, harsh cry. Two species, the *rock ptarmigan* and the *Welsh ptarmigan*, are widely distributed in North America. The former is seen in Greenland and both ranges far north in Canada.

PTERIDOPHYTES (těr'ĩ-dō-fīts), one of the four orders into which the nonflowering plants are divided, including the ferns, scouring rushes, and club mosses. They are associated with the seed plants, since they are larger in size and display a larger growth of foliage than the moss plants. The general name *cryptogams* is applied to all plants that do not bear seed, hence the pteridophytes are frequently termed *vascular cryptogams*. They do not possess a stem, but have real roots. About 4,500 species have been described. The greater number of these plants are tropical.

PTERODACTYL (těr-ō-dāk'til), the name of a genus of extinct flying reptiles, which lived in the Mesozoic or Reptilian age. They included a large number of species and are usually classed as bird lizards or wing lizards. It is presumed that they did not precede the birds, since they appear to have originated from dinosaurian ancestors. These animals had skeletons with hollow bones, fitted to fly, but exceedingly strong, and large teeth were set firmly in the jaws. Later species seem to have lost the development of teeth, but in these the jaws were larger and more powerful. In the larger forms the wings had a spread of twenty feet and some of the species were exceedingly powerful both in water and while flying, though they were less favorably adapted to move about upon the dry ground. The skin seems to have been smooth and uncovered, since no traces either of scales or feathers have been found. Fossil remains are very extensive in some sections and in general are widely distributed, especially in the limestone formations of Europe.

PTOLEMY (töl'ē-mĩ), the name of a dynasty of Egypt, which ruled that country from 323 to 30 B. C. These kings were of Grecian origin and succeeded to the throne of Egypt when that country formed one of the divisions into which the empire of Alexander the Great was divided. Ptolemy I., surnamed Soter, upon the death of Alexander in 323 B. C., became ruler of Egypt, which nominally remained a satrapy of Macedon. He is the founder of the great library of Alexandria, and during his reign was built the lighthouse on the island of Pharos. His son, Ptolemy II., succeeded him in 285. He and his successors of this line of kings are noted as patrons of learning and art, the founders and defenders of Greek culture in Egypt. Cleopatra, who belonged to this line, ruled joint-

ly with Ptolemy XIV., her brother, surnamed Dionysus, from 61 to 47 B. C., when a Roman army under Caesar defeated Ptolemy XIV., who was drowned while attempting to escape. The line became extinct with Ptolemy XVI., who was the son of Cleopatra by Julius Caesar. He reigned conjointly with his mother from 45 until 30 B. C., but was put to death by Octavius after the Battle of Actium.

PTOLEMY, Claudius Ptolemaeus, eminent Greek geographer and mathematician, flourished in Alexandria, Egypt, in the 2d century A. D. It is thought that he was born at Ptolemais, a Grecian city of the Thebaid, and that he published the result of a line of astronomical and geographical observations in 139 A. D. Some writers assign a number of discoveries to him as late as the year 161, though it is certain that his chief work, "Megale Syntaxis tes Astronomias," was published at an earlier date. This work is known among the Arabs as "Almagest," meaning *the greatest*, and includes some of the most valuable early discoveries in astronomy. The "Geographike Hyphegesis" is a noted geographical work in eight books, besides which he published a catalogue of fixed stars and a number of treatises on astrological subjects. He maintained the *Ptolemaic system* of astronomy in his "Almagest," which was so named because he was its most eminent expounder.

The theory of Ptolemy assumes that the earth is a fixed body, remaining constantly at rest in the center of the universe, with the sun and moon revolving around it as attendant satellites. The more complicated movements of the planets were represented by a contrivance illustrating each planet as revolving in a great circle called a *deferent*, while within the great circles revolve the centers of small circles called *epicycles*, the latter immediately surrounding the planets, and each member of the system having its own deferent and epicycle.

PTOMAININE (tō'mā-ĩn), the name of certain poisonous substances found in animal matter while in the state of decay. It resembles in its properties the vegetable alkaloids. The ptomaines are the products of microbe organisms.

PULLUP, a city of Pierce County, Wash., 10 miles southeast of Tacoma, on the Northern Pacific and other railroads. It is in a fertile section and has a large shipping trade in fruit. The features include the high school, public library, and electric railways. The place was settled about 1887. Population, 1920, 6,323.

PUBLIC SCHOOLS. See **Education.**

PUCK, or **Robin Goodfellow**, the name applied in England to a fairy. It corresponds to the *Knecht Ruprecht* of Germany, the *Nisse Goddren* of Scandinavia, and the *Brownie* of Scotland. Shakespeare employs *Puck* as a prominent figure in his "Midsummer Night's Dream." Writers generally regard the term applicable to all species of sportive fairies which

are capable of serving in domestic relations, but generally characterized by their jovial and merry pranks. They are represented in literature as of small stature, affectionate to the beautiful, mischievous to the housemaids, and easily induced by kindly gifts to serve in performing many household duties. A widely read illustrated weekly periodical published in New York City has adopted *Puck* as its name.

PUEBLA (pwă'blà), a city of Mexico, capital of the state of Puebla, 68 miles southeast of the City of Mexico. It is located on a fertile plain about 7,000 feet above sea level, has railroad connections, and is the center of a large trade in agricultural produce and manufactures. The streets are regular and wide, intersecting each other at right angles. It has many substantial buildings, including the museum, the theater, several colleges, and a splendid cathedral. The manufactures have long been among the most important of Mexico. They include cotton and woolen goods, boots and shoes, glass, leather, soap, earthenware, and machinery. The city was founded in 1533 by the Spaniards. Santa Anna made an unsuccessful effort to capture it in 1845 and Maximilian reduced the place on May 17, 1863, after a siege of two months. Population, 1920, 101,214.

PUEBLO (pwěb'lô), a city of Colorado, county seat of Pueblo County, on the Arkansas River, 115 miles south of Denver. Communication is furnished by the Missouri Pacific, the Colorado and Southern, the Denver and Rio Grande, the Chicago, Rock Island and Pacific, and the Atchison, Topeka and Santa Fé railroads. It is the second city of the State and one of the most prosperous cities between the Rocky Mountains and the Missouri River. It has electric and gas lighting, public waterworks, sanitary sewerage, well graded and paved streets, and electric street railways. Among the noteworthy buildings are the county courthouse, the city hall, the high school, the McClellan Public Library (in a Carnegie building), the State insane asylum, and many fine schools and churches. The City Park and the Mining Palace Park are among the fine public resorts.

Pueblo is surrounded by a region which produces gold, silver, and other minerals. It has a large wholesale and jobbing trade. The manufactures embrace wire, furniture, lumber products, carriages and wagons, farming implements, mining machinery, hardware, and earthenware. It is the seat of important railroad shops and smelting works. The vicinity was first settled by the Mormons in 1846 and soon after became a trading post. It was platted in 1859 and incorporated in 1873. Population, 1900, 28,157; in 1920, 42,908.

PUEBLO INDIANS, the inhabitants found by the Spaniards in Mexico, New Mexico, and Arizona, when exploring that region in the 16th century. Their state of society was of a semi-civilized character at the time of the discovery

of America. They lived in villages and the tribe was divided into four groups, each speaking a different dialect. The men were about five feet tall, the women were somewhat smaller in stature, and their complexion was a fair olive. Their dwellings were largely in villages. They engaged in agriculture, mining, and manufacture. The villages were built in the form of rounded or oblong squares, and some of their habitations were large enough to contain a number of families, being several stories high and in many cases from 200 to 500 feet long. These dwellings were made of sun-dried brick with crossbeams and finishing of wood, and in them were apartments for different families of the tribe, each occupying an eating and a living room, a store room, and a kitchen. To provide against attacks of enemies, they made no doorways or entrances in the lower stories, but entered the dwellings by means of ladders from the roof or through upper apartments.

The Pueblos were skilled in weaving and spinning. They made pottery, baskets, utensils, and building material, and were considerably advanced in cultivating the soil. Many of their villages may still be traced and there are evidences of vast systems of irrigation in some parts of Arizona and New Mexico, indicating that they conducted the water by dams, ditches and embankments for many miles to supply sufficient moisture for the germination and maturity of crops. Their clothing was made of cotton, fur, fibers derived from bark, and feathers. The weapons consisted of stone axes, lances, flint knives, bows, and javelins and the warriors wore helmets and shields of the skins of animals. It is evident that they possessed considerable advancement in the use of medicines, had a system of instruction, and conducted spiritual worship.

When the Spaniards conquered Mexico, fully 30,000 Pueblos were resident in Mexico and the regions immediately north. It is evident that large numbers of these people resided in Texas, Utah, Colorado, and Nevada at different times, since many ruins of houses and villages have been discovered, some being now covered by sands. It is thought that they were prevented from spreading farther to the north by hostile Indians and that they were driven from their northern possessions in different periods. Some writers think that the cliff dwellers were the ancestors of the Pueblos, since many ruins of cliff dwellings discovered in the cañons of Mexico, Arizona, and Colorado bear some marks of similarity to the dwellings constructed by the Pueblos.

Among the noted cliff dwellings are those of the San Juan cañon, where remarkable habitations were occupied fully 1,000 feet above the Mancos River. In other places clusters of dwellings were constructed upon terraces formed by the wearing away of the soft strata of limestone or sandstone. Some of these dwell-

ings occupied a position between upper and lower terraces, the two forming a natural floor and roof, while the openings were faced with walls of sun-baked brick and coated with a natural cement to closely resemble natural cliff formations. At present there are about 10,000 Pueblos, who are direct descendants of those discovered by the Spaniards, and their modes of living and industries closely resemble those of their ancestors. Most of the Pueblo settlements are in the valley of the Rio Grande and the valleys of its tributaries. Among the most important villages is Zuñi, situated near the western boundary of New Mexico, and in the northeastern part of Arizona are the seven Moqui villages. Christian missionaries have induced some to embrace Christianity, but the greater number still hold to their ancient traditions, though their civilization and industries have been materially affected by the teachings of the whites.

PUERTO PRÍNCIPE (pwâr'tô prên'sê-pâ), a city of Cuba, capital of the province of Puerto Príncipe, 300 miles southeast of Havana and 25 miles from the Atlantic Ocean. A railroad connects it with Nuevitas, its port on Nuevitas Bay, an inlet from the Atlantic. It is surrounded by a fertile country and yields sugar, tobacco, cereals, and cattle. The features include the post office, the cathedral, the townhall, the railway station, and the ruined military post. Among the manufactures are cigars, clothing, earthenware, and utensils. It has a growing trade and good municipal improvements. Population, 1918, 29,481.

PUFENDORF (puf'ên-dôrf), **Samuel**, philosopher and clergyman, born in Chemnitz, Germany, Jan. 8, 1632; died Oct. 26, 1694. He first studied at Grimma and later at Leipzig and Jena. Soon after completing his studies at the latter university, he became tutor to the son of the Swedish ambassador at Copenhagen. In 1661 he accepted the chair of Roman law at Heidelberg, where he attained remarkable success by his eloquence and careful devotion to the subject-matter of instruction. He accepted the professorship of law of nations at Lund, offered him by Charles XI. of Sweden, in 1670, and in 1677 became historian to the King of Sweden with the dignity of counselor of state, and took up his residence at Stockholm. In this capacity he published a history of Sweden from the expedition of Gustavus Adolphus into Germany to the death of Christina.

The Elector of Brandenburg invited him to Berlin in 1688, where he wrote the history of his life and reign, which was published in nineteen volumes. It was his intention to resume historical writing in Sweden, but his death occurred at Berlin. Pufendorf exercised remarkable industry in gathering material for his work, for which purpose he drew largely from archives, and the genius with which he labored portrayed the marks of great intellectual power.

Among his publications are "History of Charles Gustavus," "History of the Principal States of Europe," "History of Sweden from the Expedition of Gustavus Adolphus into Germany to the Death of Queen Christina," "Life and Reign of the Elector of Brandenburg, Frederick William," and "Spiritual Monarchy of the Pope." The King of Sweden made him a baron in 1694.

PUFF ADDER, a species of poisonous serpents native to Africa, but most abundant in the regions south of the Equator. It is one of the most dangerous serpents of Africa. The length is from four to five feet, and it is quite thick in proportion to its length. It is so named because when irritated puffs appear on the upper part of its body. The Bushmen poison their arrows with its venom.

PUFFBALL, the name of any fungus of the genus *lycopodon*, so called from the shape and from its puffing out dark colored dusty spores when the matured plant is broken open. Puffballs grow in roundish form on the ground or on decaying wood, and when immature have a firm and fleshy interior, which later becomes a powdered mass. The spores are borne in cavities in the interior of the globular mass, and, when the surrounding tissues become dried and ruptured, they escape in the form of fine dust. Some species grow without a stem, while others appear at the upper part of a fleshy prominence and often acquire a circumference of several feet. Many are edible and their fumes are used in some countries instead of chloroform for anaesthetic purposes.

PUFFIN (pŭf'fîn), a genus of diving birds of the auk family, native to the Arctic and northern temperate regions. The bill is deep and excessively compressed, with naked skin at the outer and back part of the mouth, and the upper mandible extends to the top of the head both mandibles being transversely grooved. The wings, tail, and legs are short, and, like the auks and penguins, they rest or sit in an upright position. Though able to fly rapidly, they cannot sustain long flights, but have much skill in swimming and diving. The puffins are migratory birds and are seen in large flocks. They feed on fish, insects, and many forms of shell life. The flesh and eggs are alike wholesome for food. Thousands of puffins may be seen in the North Atlantic and Pacific oceans, especially in Kamchatka and the Kurile Islands.

PUG, the name of a small breed of dogs which is grown chiefly for use as a house pet. The nose is short, the forehead is wrinkled, and the hair is short. Most of the full-blooded specimens have a fawn color, while the body is stout and the eyes are large. This breed of dogs seems to have been brought from the East Indies to Holland, whence it was taken to other countries and finally to America.

PUGET SOUND (pŭ'jět), an inlet from the Pacific Ocean, on the northwestern coast of Washington, which it separates from the island

of Vancouver. It is the southern continuation of the Strait of Juan de Fuca and Admiralty Inlet, has a coast line 280 miles in length, and contains a number of important islands and bays. Ships of the largest size may sail safely in all parts of the sound, since its shores are high, and deep water extends very near to the land. The surrounding country is fertile and richly timbered, while canal and railroad improvements have greatly enlarged its commercial importance. The principal cities on its shores are Olympia, Tacoma, and Seattle.

PUGH, James Lawrence, statesman, born in Burke County, Georgia, Dec. 12, 1820; died March 9, 1907. He accompanied his parents to Alabama in infancy, where he received an academic education, and in 1841 was admitted to the bar. Soon after he became a member of the State senate and in 1859 was elected to Congress, but retired when Alabama seceded from the Union in 1861. He was elected to the Confederate Congress in the same year and was re-elected in 1863, but served as a private in the Confederate army. In 1875 he aided in framing the State constitution and in 1880 became a member of the United States Senate, to which he was re-elected in 1884 and in 1890. Pugh was a leading and influential member of Congress and took part on many important committees and in several notable debates.

PULASKI (pŭ-lās'kī), **Casimir**, Polish count and patriot, born in Podolia, Russia, March 4, 1748; died near Savannah, Ga., Oct. 11, 1779. He was an active opponent of Russian oppression and joined his father and brothers in opposing King Stanislaus Augustus. After the death of his father, he became leader of the insurgent forces, and in an attack on Warsaw attempted to capture the king, but, being defeated in battle, he was required to seek safety by fleeing to France. He met Benjamin Franklin while in Paris, in 1775, and two years later joined the American army at Philadelphia against the British. Congress made him brigadier general for distinguished services in a number of engagements, particularly at the Battle of Brandywine. He entered Charleston with his command of infantry in May, 1778, and on Oct. 9, 1779, was mortally wounded at the siege of Savannah. He was taken on board the United States brig *Wasp*, on which he died two days later, and his body was buried at sea. A monument was erected to his memory by the citizens of Savannah.

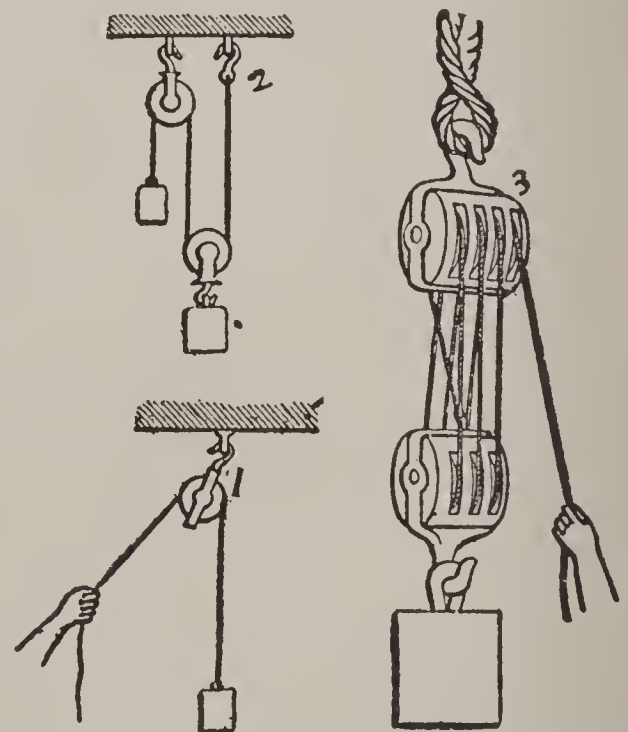
PULITZER (pŭ'līt-sēr), **Joseph**, American journalist, born in Budapest, Hungary, April 10, 1847. He studied in his native city, but came to America while yet a youth, and soon engaged as reporter on the *Westliche Post*, Saint Louis, a German periodical which was under the editorial charge of Carl Schurz. His able and efficient service soon made him managing editor and later proprietor of the journal. He became a member of the Missouri Legis-

lature in 1869, supported Horace Greeley for the Presidency, and in 1884 was elected to Congress as a Democrat. In the meantime he founded the *Saint Louis Post-Dispatch*, which he made a factor in State politics. His journalistic work caused him to resign his seat, giving his entire attention to the publication of the *New York World*, which he purchased in 1883. This periodical had only a limited circulation, but the untiring energy of Pulitzer placed it on a profitable and influential basis until it became one of the most popular journals of modern times. He erected one of the tallest edifices in New York City, the *World* building, and founded, in 1903, a school of journalism at Columbia University. In 1909 he and others charged the administration of President Roosevelt with corruption in purchasing the French holdings in the Panama Canal, which resulted in a long controversy. He died Oct. 29, 1911.

PULLEY (pul'ly), one of the six simple machines or mechanical powers. It consists of a grooved wheel mounted in a block and is used



JOSEPH PULITZER.



PULLEYS.

to increase power and transmit it, by means of a rope or flexible cord, in a changed direction. The ends of the axis of the wheel are supported by a framework called the *block*, and a groove cut in the edge of the wheel prevents the rope from slipping off when it is put around the pulley. Pulleys may be *fixed* or *movable* as shown in the accompanying figures; the former are those in which the block containing the pulley is fixed, as in figure 1, while the block in the latter class is adjusted to move with the

raising or lowering of the rope, as shown in figure 2. There is neither gain nor loss of power with a single fixed pulley; for, as the tension in every part of the rope is the same, if a weight be suspended at one end, an equal weight must be applied at the other end to maintain equilibrium. Hence, the effect of a fixed pulley is simply to give advantage in changing the direction of a force. However, by combining several pulleys in various ways, an instance of which is shown in figure 3, it is possible to gain purchase or mechanical advantage, this depending more or less upon the mode of combination and the number of pulleys utilized.

The advantage of a system of pulleys may be computed by comparing the velocity of the weight raised with that of the moving power; hence, it may be considered that a single movable pulley gives a mechanical advantage equal to two, or the weight may be said to be twice the power. A single fixed pulley is considered a lever of the first class, a single movable pulley is a lever of the second class, and in combinations the utility of both is more or less exemplified. In theory the advantages are increased as the movable pulleys are multiplied in combination, but advantages that would ordinarily result are to some extent overcome by the friction caused by imperfect flexibility of the ropes. This is due also in part to the friction of the pulley sheave upon its axis, which is now quite largely overcome by making the framework of iron or steel and adjusting the axis so that ball bearings may be utilized. The term *pulley* is variously applied in machinery, particularly to a wheel on which a band or belt runs for changing the direction of motion, or one in which power is transmitted to or from different parts of the machinery.

PULLMAN (pul'man), **George Mortimer**, inventor, born in Chautauqua County, New York, March 3, 1831; died Oct. 19, 1897. After obtaining a general education, he engaged as a mover of houses and in 1853 contracted to move warehouses along the Erie Canal, which was being widened at this time. He settled in Chicago in 1859, where he contracted to raise brick and stone business blocks without disturbing the business of the occupants. This work was done successfully by a system of jackscrews, and the buildings were thus brought to conformity with the graded streets. In 1863 he turned his entire attention to the building of sleeping coaches and soon after organized the Pullman Palace Car Company. The business increased with such rapidity that he founded the industrial town of Pullman in 1880. This town is situated fourteen miles south of the center of Chicago, near Lake Calumet, and covers an area of 500 acres. It is finely platted, has modern municipal facilities, a circulating library, and is the seat of vast manufacturing enterprises. It is not only supplied with all the

best sanitary conditions, but modern conveniences and the social and educational welfare have been kept in mind. In 1890 the town of Pullman was incorporated with the city of Chicago. Mr. Pullman designed the vestibule train, by which the separate coaches of an entire train are united by connections forming safe and convenient passage to all the cars. He was president of a company that constructed the metropolitan street car system of New York City and promoted many other enterprises. One of his sons, George M. Pullman, died at San Mateo, Cal., Nov. 28, 1901. He was born June 26, 1875.

PULQUE (pul'kâ), a vinous beverage made in many sections of Spanish America, especially in Mexico, by fermenting the juice of several species of the agave. It is milky, resembling thin buttermilk, and has a sour taste and an ill smell to those not accustomed to its use. The maguey species of agave, also called the *American aloe*, is used mainly, since it contains the greatest amount of sugar, and the pulque is made by fermentation.

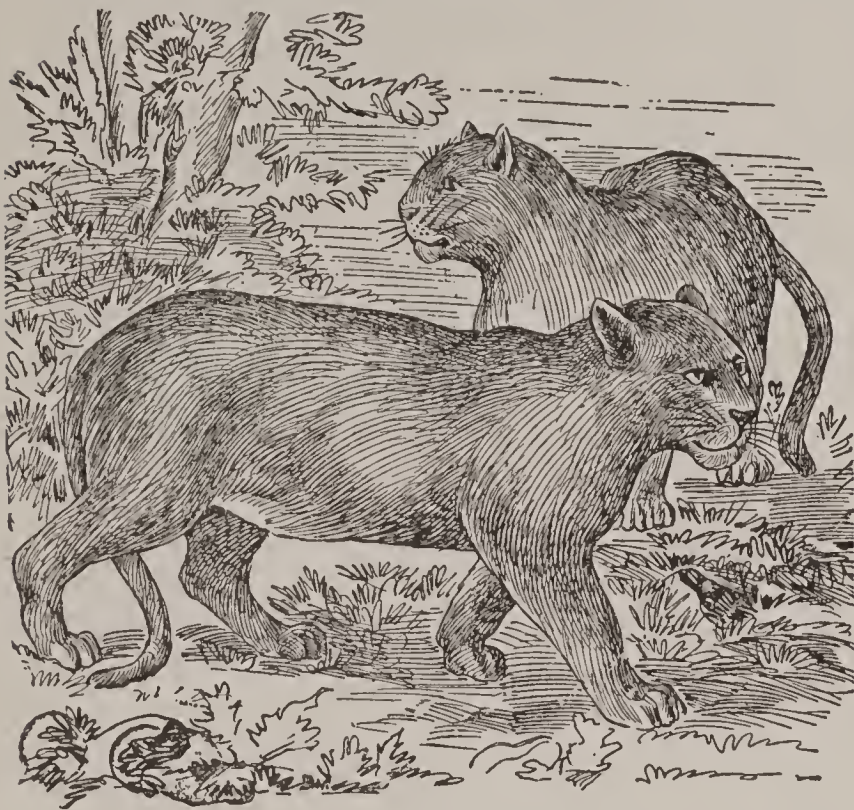
PULSATILLA (pül-sâ-tîl'lâ), or **Pasque Flower**, a genus of flowering plants native to Europe. The species are perennial, have bell-shaped flowers of a bluish color, and bear long, feathery awns on the fruit. The plants are narcotic and acrid. They yield a preparation known as *pulsatilla*, a medicine used in catarrhal inflammation, bronchitis, and other ailments. The flowers yield a bluish-purple coloring matter used quite largely in preparing Easter eggs.

PULSE, the beating of the arteries, due to the passage of the blood waves caused by the successive contractions of the heart. It is noticeable, more or less, in many parts of the body in the state of poor health, but during health it is present only in the arteries, and may be felt by placing a finger lightly upon an artery running over a bone, as the radial at the wrist, or the temporal in front of the ear. The pulse varies at different ages and under different conditions. At birth the number of beats is about forty per minute; at the end of the first year, 120; at the end of the second, 110; during middle life, between 70 and 80; and in old age, usually a little more. Males have from five to eight beats less than females. The pulsations are more numerous during excitement or exertion, but they are noticeably diminished while reclining or sleeping. The force and rate of pulsations are taken as an indication of the condition of health, but they cannot be considered reliable symptoms of a particular disease without considering other conditions. In some diseases, particularly those affecting the heart, it is not infrequent for the pulse to beat as low as 25 pulsations per minute, while in fevers and other ailments they sometimes reach 200. In diseases of the brain or organic affections of the heart, it is quite common to notice

much irregularity of the pulse, though it is natural to some persons to have irregular pulsations. An irregular pulse is due either to the motions of the artery being unequal in number and force, a few beats being from time to time more feeble than the rest, or to a pulsation being left out entirely, thus causing intermission of the pulse from time to time.

PULTOWA. See *Poltava*.

PUMA (pū'mā), or *Cougar*, an American carnivorous mammal, ranging from Canada to Patagonia. It has a reddish-tawny color above



PUMA.

and paler shades beneath. The adult is about three feet high and four feet long, measured from the nose to the tip of the tail. The puma is an expert climber, but is not confined to the timber districts. It is seen frequently among shrubs along the banks of rivers and on the open prairies and pampas. Its habits are much like those of the leopard, killing many more of the animals upon which it preys when convenient than it is able to devour, either for the sake of securing warm blood or gratifying an instinct to destroy. Pumas prey on cattle, sheep, swine, and other domestic or wild animals, but rarely attack man. When pursued they seek safety by ascending lofty trees. The name *cougar* was first applied by the French, while the Spaniards still call it *leon*, and hunters of the United States know it generally as *panther*. The puma may be domesticated with little difficulty.

PUMICE (pūm'is), a light mineral substance of volcanic origin, formed under the action of bubbles of steam or gas which accompany lava during a liquid state. It is highly porous and may be said to be a spongy, frothlike lava. Pumice is found principally in the vicinity of volcanoes, whence it was ejected, and its color is whitish or gray, though there are slate-blue and reddish tints. Its numerous pores render

it so light that it floats readily on the surface of water, sinking only after being thoroughly saturated. Pumice is obtained largely from Iceland, the Lipari Islands, at Andernach on the Rhine, and the volcanic regions in America. It is of value in polishing ivory, wood, leather, marble, bone, and metals.

PUMP, an apparatus for raising, exhausting, compressing, or circulating a fluid by drawing or pressing it through pipes or apertures. Many varieties of pumps have been invented, differing more or less in construction according to the purposes for which each is intended. The most important are the suction pump, the lifting pump, the force pump, and the centrifugal or rotary pump. The *suction pump* is the most common of these four classes and is in general use for household purposes. It has a piston that works air-tight within a hollow cylinder or barrel, which is moved up and down by a handle connected to the piston rod, and has a valve (*P*) opening upward, as is shown in figure 1. Another valve (*V*) opening upward is at the bottom of the barrel, and, as the piston is raised, a vacuum is left below it in the pump barrel, into which the water of the well is forced by the pressure of the air. As the piston descends the valve at the bottom of the barrel closes and the valve in the piston opens, thus making a passage for the water above the piston. By successive movements of the piston the water reaches the mouth of the pump and escapes.

The suction pump and the force pump cannot exceed about 35 feet, since a column of water of that height exerts a pressure equal to that of the atmosphere, though in practice pumps seldom raise water higher than 28 feet from the lower valve to the level of the wall. The *lift pump* is not limited in this way, since in this class of pumps the tube is placed a considerable depth into the well, and the piston is near the bottom of the pump tube. In the piston is a valve opening upward, thus allowing the water in the well to pass through it, and when the piston is drawn up its valve closes, while the valve near the mouth of the pump allows the water to pass through it, but when the piston descends it closes and does not permit the water to return. Thus, by a succession of movements, the water may be lifted from any depth, but the weight of the water makes it quite laborious to operate a lifting pump from great depths.

The *force pump* is used to force water into the higher stories of buildings, into standpipes or reservoirs of city waterworks, and to throw water over gardens or burning buildings. It has a solid piston that works air-tight in a tube or box (*P*) at the top of the pump barrel, and, as it is moved upward, the water rushes into a vacuum beneath it. When the piston or plunger moves downward, the lower valve (*B*) closes, while the valve (*A*) in the side pipe opens be-

fore the water that is forced outward by a pressure equal to the downward pressure of the piston. Force pumps are made also with double action, thus causing a continuous stream to flow from the mouth of the pump. The *chain pump* is used successfully where the supply of water near the surface is abundant. It consists of an endless chain passing over two fan-shaped wheels, one at the bottom of the well and the other at the surface. As the chain is put in motion by a crank the cups passing upward through a pipe carry the water to the mouth

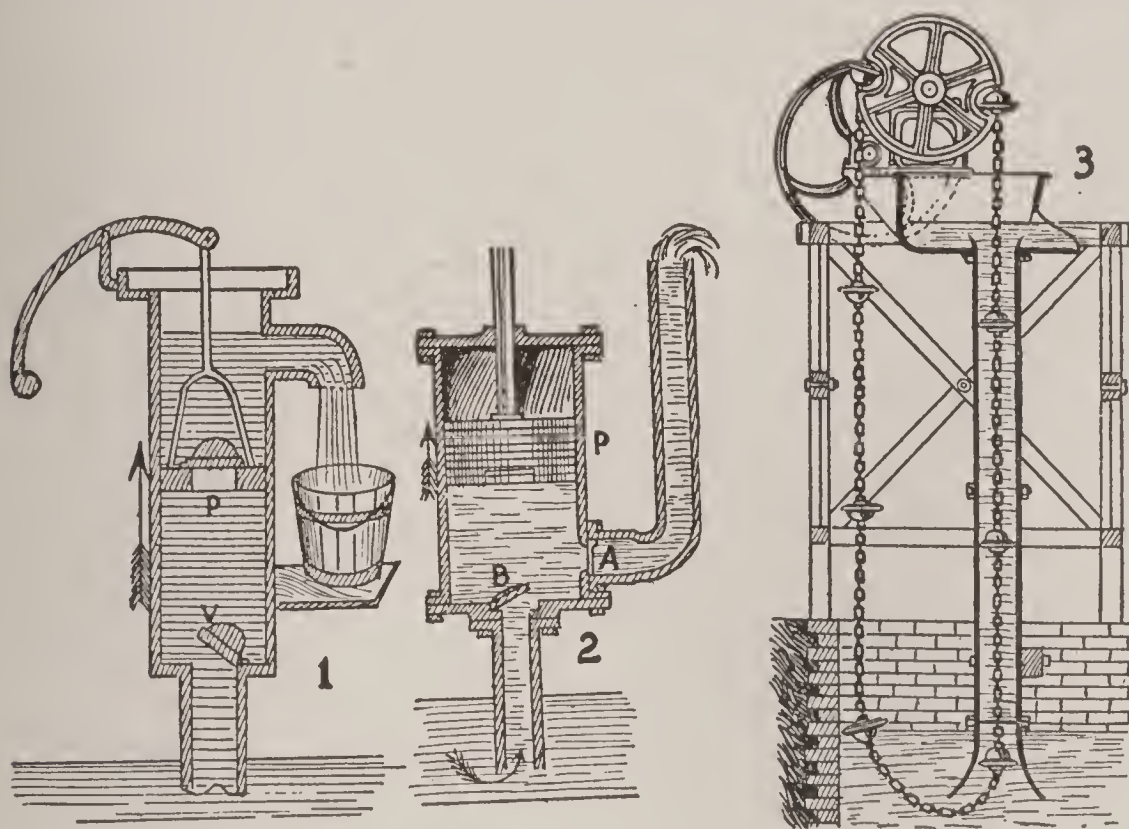
steel and its shape depends upon the uses for which it is intended. Punches for cutting steel pens, buttons, jewelry, and other similar articles are hollow and sharp-edged, while those for stamping dies, perforating, and driving objects into or out of metallic plates are solid. The name *punch* is applied to an alcoholic beverage made of wine and spirits. It is sweetened and flavored with orange or lemon, and commonly diluted with water. The *London Punch* is a weekly magazine devoted to comic, satirical, and humorous literature. It was founded in 1841

by Mark Lemon and Henry Mayhew, and is now as important in the publication of comic sketches in prose, verse, and caricature as is the *Puck* in America or the *Kladderadtsch* in Germany.

PUNCH AND JUDY, or *Punchinello*, in Italian *Pulcinella*, a popular puppet show of Italian design. Its origin is ascribed to Silvio Fiorello, a comedian who flourished about the middle of the 17th century. The principal figures are Punch and Judy, two cleverly contrived puppets worked by a person within a box, while a second person stands on the outside to keep up the dialogue, which is carried on with the person inside, though it is represented that the figures do the talking. Punch and Judy

represent various scenes in domestic and public life, though generally a man and his scolding wife, the latter being carried off by a policeman or demon as the closing scene.

PUNCTUATION (pŭnk-tŭ-ā'shŭn), the art of dividing written discourse into sections by means of points for the purpose of marking the grammatical connection and dependence, and making the sense more obvious to the eye. In ancient writing words run together successively without break or pause, though in the later specimens points are used for oratorical purposes. Aristophanes, the Greek grammarian of Alexandria, invented a system of punctuation, but this was forgotten to such an extent that Charlemagne employed several scholars to restore it. Aldus Manutius, a printer of Venice, Italy, in the latter part of the 15th century invented the main features of the modern system of punctuation. As there is no arbitrary punctuation, it is necessary to exercise good judgment and taste for the purpose of avoiding defects, ambiguity, or confusion in the construction of a sentence. A sentence unpointed and unspaced in the manner of the ancients is difficult to read, and at first sight appears to be written in an unknown tongue. The following is an example of the two methods, one written



PUMPS.

1, Suction Pump; 2, Force Pump; 3, Chain Pump.

of the pump. *Centrifugal*, or *rotary*, pumps are capable of lifting large quantities of water at short distances, and consist of a fan-shaped wheel that is rotated rapidly in a casing. The wheel is connected with the water by a pipe, and the rapid movement causes the water to flow by means of centrifugal action.

PUMPKIN (pŭmp'kĭn), a trailing plant of the gourd family native to India, but now naturalized and cultivated in practically all countries. The leaves are heart-shaped, the flowers are large with yellow petals, and the vine often grows to a length of ten to twenty feet. Many species of pumpkin are grown, the fruit ranging in size from a few inches to two feet in diameter. The seeds are situated in rows within the fruit. They are small, white, and flat, and yield valuable medical properties useful in cases of tapeworm. Pumpkins are cultivated extensively in many localities of North America for domestic food and as food for cattle. The fruit is yellow or reddish. It is used in making pies and butter and is eaten when baked.

PUNCH, a tool for indenting or perforating sheets or plates of various materials, such as iron and steel, and for driving out or in an object inserted in a hole. It is usually made of

solid, and the other properly spaced and punctuated: Readingmakethafulmanconferencea-readymanwritinganexactman. Reading maketh a full man; conference, a ready man; writing, an exact man.

The chief use of punctuation is to divide discourse into sentences, and these again into parts, in a manner so as to show the relation of the several parts to each other. It is based largely on grammatical analysis, requiring accurate discrimination. A change in the punctuation of a sentence generally produces a change in the meaning. This is nicely illustrated by an incident connected with the proceedings of the English House of Commons, where a member was required to publicly apologize for calling another a liar. This he did, while standing in the presence of the body, in these words: "I said he was a liar, it is true; and I am sorry for it." The apology was generally accepted as satisfactory, but a London newspaper gave it a different meaning by publishing it in this manner: "I said he was a liar; it is true, and I am sorry for it." Another example of the necessity of care in punctuation is the following:

John Keys, the lawyer, says he is guilty.
 John, Keys the lawyer says he is guilty.
 John Keys, the lawyer says he is guilty.
 "John Keys the lawyer," says he, "is guilty."

The principal European languages employ six chief points in punctuation. These include the *period* (.), placed after every declarative or imperative sentence and after every abbreviated word; the *comma* (,), employed to denote the least degree of separation, and for separating the members of a compound sentence and dependent clauses; the *semicolon* (;), used to separate parts of sentences less closely connected than those separated by commas; the *colon* (:), employed to separate parts of sentences less closely connected than those separated by the semicolon; the *interrogation point* (?), used to show that a question is asked; and the *exclamation point* (!), used to indicate some emotion.

Many miscellaneous marks are used for different purposes in writing. These include the *dash* (—), employed to indicate an omission, a sudden pause, a sudden or abrupt change in the construction of a sentence, and sometimes to add effect to other marks; the *parentheses* (), used to inclose words that break the unity of the sentence; the *brackets* [], employed to inclose some word or words necessary to explain or correct an error; the *quotation marks* (" "), used to inclose quotations from the language of another person; and the *apostrophe* ('), employed to indicate the omission of a letter. The *section* (§) denotes the small divisions of a book or chapter, the *ellipsis* (****) indicates the omission of words, and the *caret* (^) is used to show that something has been omitted. Various marks are employed to refer to marginal notes, such as the *asterisk* (*), the *dagger* (†), the *double dagger* (‡), the *section*

(§), the *paragraph* (¶), and the *parallel* (||). The *index* (☞) is used to designate some important statement or sentence, and *dots* (.....) indicate that words have been omitted from a quotation.

PUNIC WARS (pū'nīk), the name of three great wars between the Romans and the Carthaginians. The First Punic War was a contest for the possession of Sicily. It covered a period of 23 years, from 264 to 241 B. C., and was finally won by the Romans. Hannibal instigated the Second Punic War to capture Saguntum and other territory. It began with the great invasion of Italy in 218 and ended by the Roman victory at Zama in 202 B. C., lasting a period of 16 years. The Romans undertook the Third Punic War with the intention of destroying Carthage and thus humiliate its rival. This war lasted three years, from 149 to 146 B. C. Although Carthage made a most heroic defense, it was utterly destroyed never to rise again.

PUNJAB (pūn-jāb'), or **Panjab**, the most northerly province of India, so called because the region is drained by the five tributaries of the Indus—the Ravi, Beas, Sutlej, Chenab, and Jhelum rivers, the word Punjab meaning *five rivers*. The province is somewhat larger than the Punjab proper. It lies immediately east of Afghanistan and Beluchistan, south of Cashmere, west of the Northwest Provinces, and north of Rajputana and Sind. It has a total area of 110,675 square miles. Ranges of the Himalayas traverse the northern part, but in the southern portion the surface is either level or undulating and consists of a great alluvial plain. Extensive deposits of rock salt and alum beds abound, and there is an abundance of limestone for building purposes. The principal products are tobacco, wheat, barley, opium, rice, cotton, sugar cane, maize, indigo, tea, and flax. Valuable forests are abundant, but there is a scarcity of rainfall in some sections, making it necessary to irrigate from wells and reservoirs in a portion of the region. Lahore, the capital, is situated in the center of the province. Other cities are Delhi and Amritsar. Manufacturing enterprises are successfully carried on in the cities. It has extensive interests in rearing live stock, including camels, cattle, sheep, and goats. The people are mostly Mohammedans. Population, 1918, 22,346,108.

PURDUE UNIVERSITY, a coeducational State institution at Lafayette, Ind., established in 1869 and so named from John Purdue. It embraces departments of civil engineering, agriculture, science, pharmacy, electrical engineering, and mechanical engineering. Admission is upon examination or a certificate from a commission school. Students are required to do shop and field work in addition to pursuing the usual branches of study. It has a campus and a farm of ninety acres, a library of 45,000 volumes, and property valued at \$2,100,000. The average attendance is about 1,850 students.

PURGATORY (pûr'gà-tô-rÿ), a place of purgation or punishment in which Roman Catholics believe the souls of the just expiate the offenses committed in this life. They think that every sin, no matter how slight, deserves and will receive punishment either before or after death. While the guilt of sin and the eternal punishment due to grave offenses are removed by the absolution of a priest in the sacrament of penitence, the temporal penalty which has to be undergone as a satisfaction of God's justice yet remains. Purgatory is a middle state for such as do not deserve hell and are yet not sufficiently pure to enter heaven. While in purgatory the souls are believed to receive relief from suffering through the prayers of the living. The Greek Church admonishes its members to pray for the dead, but does not believe in purgatory, and the doctrine is wholly rejected by the Protestants.

PURITANS (pûr'i-tanz), the name first applied in England, in 1564, to a class of Protestant members of the Church of England who desired to purge more completely the Roman Catholic ceremonies from the practice of the church. The liturgy and discipline arranged by Archbishop Parker still retained certain features of the Roman Church, which the Puritans wished to eradicate without destroying the existing establishment. They differed from the Separatists, or Independents, in that the latter preferred to abandon the established church. Among the Separatists were the Pilgrim Fathers who came to Massachusetts. Later the Puritans became either Presbyterians or Independents, both in England and the new settlements of America, and their spirit was one of severe moral earnestness, united with a Calvinistic theology.

The spirit of Puritanism exercised a marked influence on the policy of England in the reign of James I. and Charles I., both making vigorous efforts to exterminate it, but its power grew even more important when Laud and Charles sought to abridge the national liberties of the people. Cromwell was the recognized representative of the Puritans, and his triumph was made possible by the devoted efforts of Puritans in the Parliament and in the army. Many Puritans emigrated to America after the return of episcopacy with the restoration of 1660 and the Act of Uniformity of 1662. They are the founders of the New England states. The opposition to amusements grew into a spirit of persecution, but it began to relax at the beginning of the 18th century. Puritanism was the most rigid in New Haven and Massachusetts and exercised a molding influence in Connecticut, Rhode Island, New Jersey, Maryland, and South Carolina.

PUSEY (pû'zÿ), **Edward Bouverie**, noted clergyman, born at Pusey, England, in 1800; died Sept. 16, 1882. He was the son of Philip Bouverie, younger brother of the first Earl of

Radnor, who assumed the name of Pusey, and in 1822 graduated from Oxford. Soon after he became fellow of Oriel and was appointed professor of Hebrew at Oxford in 1828, a position he held until his death, and to which a canonry at Christ Church was attached. He visited Germany with the view of studying religious movements and published his first work, entitled "State of Religion in Germany." In 1835 he joined Newman and Keble in publishing "Tracts for the Times." The vice chancellor of Oxford suspended him in 1843 from the ministry for three years on account of preaching a sermon inculcating the high sacramental doctrine on the Holy Eucharist.

When Newman went over to Catholicism, Pusey preferred to remain in the Anglican Church and continued to defend evangelical doctrines with great force by lectures and pen. For more than half a century he ranked as one of the chief members of the Church of England, and in private life as well as in public affairs he practiced the most devout spirit of sincerity and gentleness. His influence extended to the support of churches and societies, while he aided liberally by gifts to the poor. Among the many works from his pen are "Lectures on the Prophet Daniel," "Defense of Church Principles," "Private Confession in the English Church," "Letters to the Archbishop of Canterbury," "Benefits of Cathedral Institutions," "On Holy Baptism," "Councils of the Church," and "Catalogue of Arabic Works in the Bodleian Library."

PUT-IN-BAY, a village and summer resort of Ohio, on South Bass Island, in Lake Erie, forming a part of Ottawa County. It is forty miles east of Toledo, with which it has communication by steamboats. On Sept. 10, 1813, Commodore Perry won a victory over the English under Captain Barclay, the seat of battle being about twelve miles northwest of this place. It is visited during the summer by many tourists and has many fine hotels. Population, 1900, 317; in 1920, 216.

PUTNAM (pût'nəm), a city in Connecticut, one of the county seats of Windham County, on the Quinebaug River, 25 miles south of Worcester, Mass. It is on the New York, New Haven and Hartford Railroad and is surrounded by an agricultural region. Cargill Falls are in the vicinity. The chief buildings include the public library, the high school, and the Day Kimball Hospital. Putnam has a large trade in lumber and lumber products. Among the manufactures are cotton textiles, woolen and silk goods, boots and shoes, cutlery, machinery, steam heaters, carriages, and trunks. It was settled about 1855 and received a charter as a city in 1895. Population, 1920, 7,711.

PUTNAM, **George Palmer**, publisher, born in Brunswick, Me., Feb. 21, 1814; died in New York City, Dec. 10, 1872. In 1828 he became a clerk in a bookstore and in 1840 entered the

establishment as a partner, conducting a branch house at London for seven years. He returned to New York City in 1848, where he published *Putnam's Magazine* with the assistance of George William Curtis, which was merged into *Scribner's Monthly* in 1870. From 1863 to 1866 he served as collector of internal revenue in New York, but he again entered the publishing business. Putnam aided in founding the Metropolitan Museum of Art, and served on an important committee at the Vienna University Exposition. His published works include "Tourist in Europe," "Index to Universal History," and "Biography and Useful Knowledge."

PUTNAM, Israel, patriot and soldier, born in the part of Salem, Mass., now called Danvers, Jan. 7, 1718; died May 19, 1790. He settled in Windham County, Connecticut, in 1738, where he devoted himself to fruit culture and wool growing. He entered the military service as captain at the beginning of the French and Indian War, serving in the Battle of Lake George. For gallantry as a leader of a band of rangers, he was made major in 1757 and the following year was captured by the Indians, who attempted to burn him alive, but his life was saved by Captain Molang, a French officer. He was exchanged in 1759 and three years later accompanied an expedition to the West Indies, taking part in the capture of Havana. At the beginning of the Revolutionary War he became brigadier, and for bravery at Bunker Hill was made major general by Congress. Putnam commanded at Boston, New York, and Philadelphia, and in 1777 was appointed to defend the highlands of New York. When Clinton captured the forts, Putnam was relieved of his command and spent the following two years in raising recruits for the American army. In 1779 he made a visit to his home, where he was stricken by paralysis and was obliged to give up active military life. Putnam was one of the chief "Sons of Liberty," and was a leading figure in the stirring times that characterized the early part of the Revolution.

PUTNAM, Rufus, soldier, born in Sutton, Mass., April 9, 1738; died in Marietta, Ohio, May 1, 1824. He was a cousin of Israel Putnam, studied mathematics and surveying, and in 1773 was engaged as a deputy surveyor in Florida. At the beginning of the Revolutionary War he became chief engineer with the rank of colonel, and in 1778 aided Israel Putnam in fortifying West Point. He was made brigadier general in 1783, served in the Massachusetts Legislature, and in 1787 aided Governor Lincoln in suppressing Shay's Rebellion. In 1788 he assisted in founding Marietta, Ohio. He was appointed judge of the supreme court of the Northwest Territory in 1789 and United States surveyor-general in 1793, serving until 1803.

PUTREFACTION (pū-trê-făk'shūn), the decomposition of animal or vegetable substances, which is generally accompanied by fetid

odors. It is now regarded as a kind of fermentation due to the growth of minute plants called *bacteria*, which enter the putrescible bodies—that is, those decomposing at a certain temperature in contact with air and moisture—in which they grow and multiply. Great numbers of spores of bacteria and kindred organisms are present in the air and water, but they develop most rapidly by the free contact of humid air at a temperature ranging from 60° to 30°. Putrefying animal matters give off more unpleasant gases than vegetable matters for the reason that nitrogen is more abundant in the former. Organic bodies of a higher order are changed in the process of putrefaction into lower organic compounds, but also into such inorganic compounds as ammonia and sulphuretted hydrogen, and into such substances as nitrogen and hydrogen. Putrefaction may be arrested or prevented under various conditions, such as keeping the substance perfectly dry, by the use of antiseptics, by keeping the substance in a temperature near the freezing point, by keeping it in a vacuum, or in a vessel containing air deprived of all organic germs, and by heating to the boiling point and then sealing to keep out all atmospheric air.

PYE, Henry James, poet, born in Berkshire, England, in 1735; died in 1813. He was a son of Henry Pye, studied at Oxford, and became a member of Parliament in 1784. After six years he retired and in 1792 became police magistrate for Westminster. Through the favor of William Pitt he became poet laureate in 1790, but his appointment was ridiculed by literary men. He published an epic in six books on King Alfred. His collected poems appeared under the title "Poems on Various Occasions."

PYGMALION (pĭg-mă'li-ŭn), in Greek legends, the King of Cyprus and grandson of Agenor. After making an ivory statue of a young maiden, he fell in love with it, and at his entreaty Venus endowed it with life. Later the maiden became his wife and is noted as the mother of Paphos.

PYGMIES (pĭg'mĭz), the persons of very small size, or the tribes of people which are much smaller in stature than the average of mankind. The most notable races of pigmies include the Akka, Batwa, and Obongo tribes of Central Africa. Other similar tribes include the Andamanese and Kalangs in Malaysia. These peoples have a usual height of about four and one-half feet and lead chiefly a pastoral life. Pygmies are spoken of in the fables and legends of Greece, and Homer mentions the attacks of cranes upon them on the coast of Oceanus. Many of the stories regarding pygmies have been regarded fabulous, though they are mentioned by Aristotle as existing near the sources of the Nile. This fact was verified by the German explorer, Schweinfurth, while traveling in Central Africa from 1868 to 1871. See **Dwarfs**.

PYLE (pīl), **Howard**, author and artist, born in Wilmington, Del., March 5, 1853. He studied art in a private school at Philadelphia and for some time practiced illustrating in New York City. As an artist, in producing juvenile work, he is foremost among American illustrators. Many of his subjects are from the early colonial period of America and adventures upon the sea. His books include "The Rose of Paradise," "A Modern Aladdin," "Merry Adventures of Robin Hood," and "The Story of King Arthur and His Knights." He died Nov. 9, 1911.

PYM (pīm), **John**, statesman, born near Bridgewater, England, in 1584; died Dec. 8, 1643. He descended from a good family and, after pursuing elementary study, entered Oxford University in 1599, which he left before graduating to study law at the Middle Temple. In 1621 he was elected to Parliament as a representative of the popular party, and there became distinguished as an opponent of monopolies and absolutism favored by the court of James I. He opposed the Duke of Buckingham, a favorite of Charles I., in the famous impeachment trial, and in 1640 became a leader of the Long Parliament, after that body had been in abeyance for thirteen years. At the beginning of the session Pym delivered an elaborate address, in which he summarized the grievances of the nation and boldly denounced the Earl of Strafford as an oppressor and tyrant. In the impeachment trial of Buckingham, which followed soon after, he took a leading part, and succeeded in having a bill of attainder passed upon him. Open hostilities soon followed, which led to the defeat of Charles I. and to his execution. Pym had been appointed as lieutenant of ordnance in 1643, but died about a month later. The remains were buried at Westminster Abbey, but, when Charles II. was restored, they were removed to Saint Margaret's Cemetery.

PYRAMID (pīr'ā-mīd), an architectural structure of solid masonry, built for various purposes in different parts of the world. The most remarkable pyramids are those of Egypt, situated in a group at Gizeh, near Cairo. This group begins at a point nearly opposite Cairo, on the border of the Libyan Desert, and extends southward about 25 miles. They consist of colossal masonry, rising from a rectangular base, and terminating in a point so as to form four triangular sides. The principal material used in their construction is a durable limestone quarried from the hills near by, though there are great slabs and blocks of granite placed on the outside to increase durability, which were evidently taken from quarries at great distances from the location of the pyramids. It is supposed that these structures date from a period between 3000 B. C. and 2300 B. C., and that they were designed mainly as sepul-

chral chambers of the kings. The most remarkable group consists of nine pyramids about four miles southwest of Cairo, where stood the ancient city of Memphis.

The Great Pyramid belongs to this group and was reared above the tomb of Cheops, the second king of the fourth dynasty. It was originally 481 feet high and 756 feet square at the base, and is counted one of the Seven Wonders of the world. Some of the stones are of remarkable size, and it has long been a subject for speculation as to how the ancients were able to provide mechanical power sufficient to quarry, transport, and elevate them to their proper places. Herodotus, the Greek historian, estimated that it required 100,000 men for a period of ten years to construct a causeway for the transportation of the stone from the quarries for this single pyramid, and that the labor of the same number of men was required for twenty years to complete the structure. The apex of this pyramid was once, quite sharp, but now a flat about three yards square exists at the upper part. It has suffered from removal of a part of the material to construct mosques and temples at Cairo, but still covers thirteen



PYRAMIDS AT GIZEH, EGYPT.

acres and is 451 feet high. A series of steps averaging about three feet in height are at the outer surface, though these were originally hidden by a coating. In the interior are several chambers ornamented with red granite. They may be entered only through an opening on the north side, about fifty feet above the base. Some writers think that this pyramid was built as an astronomical observatory, since the ratio of its height to the perimeter of its base is as nearly as possible that of the diameter of the circle to its circumference, and there are other structural peculiarities in support of this view.

The Gizeh pyramid of second importance is one built by Chafra, third king of the fourth dynasty. It covers about ten acres, has a base 700 feet square, and is 448 feet high. In this pyramid are two sepulchral chambers that were opened in 1816, and, though once incased and ornamented with polished stones, only a portion of the casing remains. The third pyramid of

this group was built by Menkaura, fourth king of the fourth dynasty, and is 354 feet square at the base and 212 feet high. It is the best constructed of the three greater pyramids, and still displays the best evidences of former beauty. The other six pyramids of the Gizeh group are smaller and of less interest. Another noted pyramid is about five miles northwest of Gizeh, at the village of Abou Roash. Several groups are in Nubia, probably built by the kings of ancient Ethiopia. Pyramids of considerable importance are situated in various parts of Assyria, China, India, Greece, and Italy.

The pyramids of Mexico have come down from the time of the Aztecs and rise as four-sided structures. The most important group still existing is at Teotihuacan, twenty miles northeast of the city of Mexico. It includes several hundred structures, but only two of importance. The largest has a base 900 feet square, with a height of 160 feet, while the second is 130 feet high. The most noted of Mexico is that of Cholula, having a length of 1,585 feet and a height of 178 feet. The Mexican pyramids are inferior to those of Egypt and are less remarkable and durable in structure, but all are uniform in facing the cardinal points.

PYRAMUS AND THISBE (pĭr'ā-mŭs, thĭz'bĕ), the two lovers mentioned in the fourth book of Ovid's "Metamorphoses," whose tragical history is introduced as an interlude in Shakespeare's "A Midsummer Night's Dream." The story of these two lovers is that they were tenderly devoted to each other, but parental consent was not given to their marriage, so they met secretly and conversed through an opening of the wall in their adjoining houses. It was agreed at one time that they should meet at the tomb of Ninus, and Thisbe was the first to reach the place of meeting, but a lioness caused her to flee for safety. She dropped her robe in the flight, which the lioness at once seized and covered with blood from an ox it had torn to pieces the same day. When Pyramus appeared he discovered the blood-stained robe and concluded that Thisbe had been killed, and, despairing, immediately ended his life. Shortly after Thisbe returned to the trysting place, and, when she discovered the dead body of her lover lying upon the ground, she likewise killed herself.

PYRENEES (pĭr'ĕ-nĕz), the lofty mountain range which separates France from Spain, extending from the Atlantic to the Mediterranean. The mountain range consists of two parallel chains, about 20 miles apart. Its length from the Bay of Biscay to the Gulf of Lyons is 275 miles, and its width is from 25 to 75 miles. Toward the center, nearly midway between the Atlantic and the Mediterranean, are the highest peaks, Mount Maladetta, 11,424 feet, being the culminating point. Only a few passes suitable for wagoning occur in the Pyrenees, but

in 1885 two railway lines were authorized by France and Spain to penetrate the mountains, partly at the expense of each government. These railways are located near the extreme ends of the chains and are in successful operation. The Pyrenees slope most abruptly toward the south, but there are fine springs and health resorts in both countries, and the climate is delightful.

PYRITES (pĭ-rĭ'tēz), the name of any one of the native metallic sulphides that occur in rocks of all ages. Formerly the name was applied only to sulphuret of iron, but now the term has a general application, and the various groups are designated as iron pyrites, copper pyrites, cobalt pyrites, etc. The pyrites consist of metals compounded with sulphur or arsenic, or with both. The color is yellowish and the consistency is crystalline and hard. Sulphuric acid is derived from iron pyrites; cobalt, from cobalt pyrites; and copper, from copper pyrites. Nickel pyrites has a copper-red color and yields nickel and arsenic.

PYROMETER (pĭ-rŏm'ĕ-tĕr), an instrument for the measurement of high temperatures, ranging greatly above the ordinary thermometers. The first instruments of this kind were based upon the principle that metals expand when subjected to heat, but they proved of comparatively little value for the reason the expansion does not increase proportionally with the rise of temperature. Later graphite was substituted for the platinum rod that was used, and with it a very high temperature may be measured with considerable accuracy. The most accurate instrument is the *air thermometer*, which is made by placing a column of mercury above a bulk of air in a metallic tube. Since the air expands as the temperature rises, the mercury is carried upward in the tube, and the temperature is indicated by the expansion of the air.

PYROTECHNY (pĭr'ŏ-tĕk-nŷ), the art of making and using fireworks. It is of great antiquity and was practiced among the Chinese with much skill before the art became known in other countries. While the Romans used candles, small rockets, and other similar articles, the Chinese developed a system of most brilliant mechanical arrangements, such as movable figures and devices, including those from which the figures of men and animals dart to surprise the company. Many of the forms and devices used in Europe at present are of Chinese manufacture or patterned after their productions. The manufacture of fireworks has grown to considerable importance in the United States, but notable importations are still made from China and Japan. See **Fireworks**.

PYROXENE (pĭr'ŏks-ĕn), or **Augite**, a mineral of numerous varieties, composed of calcium, magnesium, and a small quantity of iron or zinc. Other minerals that enter the composition include lime, manganese, soda, and

silicic acid. Minerals of this class are found in limestone and other rocks in which they are crystallized. Many igneous or eruptive rocks contain pyroxene.

PYRRHUS (pĭr'rŭs), King of Epirus, born about 318 B. C.; slain at Argos in 272 B. C. He was a distant relative of Alexander the Great and was placed on the throne when only twelve years of age, but after five years the crown was transferred to Neoptolemus, his great-uncle. Pyrrhus soon joined the army and distinguished himself in the battle against Antigonus, at Ipsus, in 301 B. C., and thereby recovered his dominion and shared it with his rival. In 295 B. C. he deposed his rival and became sole King of Epirus. After adding parts of Macedonia to his dominion the following year, he joined the Greeks in an invasion of Italy against the Romans, and in 280 B. C. won the celebrated battle on the Siris River, in which he terrorized his opponents by leading a charge with a large number of elephants. This victory cost him many of his best men, and after a second battle he concluded a truce and retired to Tarentum, where he wintered. In 279 B. C. he attacked the Romans in Apulia, and the next year invaded Sicily to expel the Carthaginians, but after several brilliant successes he was repulsed by the latter with great loss. In 275 B. C. he made another invasion of Italy, but was defeated near Beneventum by an army under Manius Curius Dentatus, and escaped to Tarentum with only a few of his men. His next enterprise was to invade Macedonia, where he secured a success so complete that the Macedonian troops joined him in a body. Shortly after he invaded the Peloponnesus against the Spartans. His attempt to take Sparta was unsuccessful and he next proceeded against Argos, where he was killed.

PYTHAGORAS (pĭ-thăg'ô-rās), Greek philosopher, founder of the Italic School of Philosophy, born on the Island of Samos about 582 B. C.; died at Metapontum about 500 B. C. He was the son of a successful merchant and spent thirty years in gathering knowledge from the most noted philosophers of Syria, Phoenicia, Babylon, India, Egypt, and other countries. Some writers regard him a disciple of Thales and Anaximander. It is certain that he studied the philosophy of these and other illustrious Greeks, and that he left Samos about 529 B. C. and established his school in Crotona, Italy. Although his school advanced many ideas in radical distinction from those generally accepted, large numbers of disciples were attracted to it by his recognized ability and superior character. His institution resembled a religious brotherhood for moral reformation of society rather than a philanthropical school, and his teachings were rather those of a moral reformer than a scientific instructor, though he gave his attention to political and scientific problems. While in Egypt he learned the doctrine of the

transmigration of souls from the priests, of which he became a devoted advocate, and asserted his belief that he had previously lived and passed through other stages of existence. On one occasion, when hearing the howl of a dog, he asserted that he recognized in the sound the voice of a departed friend.

The school of Pythagoras was represented by 300 members, who were bound by vow to cultivate the rites of their master and to both study and disseminate his philosophy. Its influence was exerted in favor of the aristocratic party, which influenced the democratic party to oppose him in such a manner that he was required to retire to Metapontum. Pythagoras was one of the greatest of early philosophers. He was the first to assume the title of *philosopher*, meaning lover of wisdom, instead of *sophos*, meaning a wise man. He based all creation upon the numerical rules of harmony and asserted that the heavenly spheres roll in musical rhythm. His ideas of astronomy were the most advanced of those of the early philosophers, for he taught that the sun is the center of the universe, and that the earth and planets move around it in the heavens, a view not generally accepted until 2,000 years after his death. He was commanding and dignified in appearance, taught by discourses in public assemblages, and limited himself to a vegetable food. His teaching before the students was largely scientific and philosophical, while in public he discoursed almost exclusively regarding the relations of mankind from the standpoint of ethics and morals. Since he regarded nature in uniformity with the will of God, he held that human life should make an approach to the harmony of nature. His followers regarded him as half divine and placed unquestioning faith in his teaching.

PYTHIAN GAMES (pĭth'ĭ-ān), one of the four great national festivals of Greece, celebrated every fifth year in honor of Apollo, at Delphi. It is said that they were instituted by Apollo after he had overcome the dragon Python, and until 586 B. C. they took place every eighth year, but at that time they came under the direction of the Amphictyons, who instituted their celebration every fifth year. They consisted of athletic sports, flute playing, and chariot and horse racing. Later contests in sculpture, painting, tragedy, and historical recitations were added. Prizes of gold and silver were awarded in the early history of the games, but afterward the laurel wreath and the palm branch were substituted. These games were in importance next to the Olympic games and continued to be played until about 394 A. D.

PYTHIAS (pĭth'ĭ-ās). See **Damon**.

PYTHON (pĭ'thŏn), a genus of snakes native to the tropical regions of Africa and Asia, closely allied to the boa. They differ from the boa mainly in having double plates under the tail, teeth in the intermaxillary bone, and pits

in the shields around the margins of the upper and lower jaws. Pythons attain a length of from fifteen to thirty feet and crush their prey in their coils. The tail is prehensile, with which they suspend themselves from the branches of trees near places where animals come to drink, and take them unawares by casting their coils about the neck and body. They are capable of strangling deer, tigers, buffaloes, and other animals. The two most important species are the *rock snake* of the East Indies and the *Natal rock snake* of Africa. Allied but smaller species are found in Australia and the Malay peninsula. The female python lays its eggs in a nest near a body or stream of water and hatches them by the heat of the body.

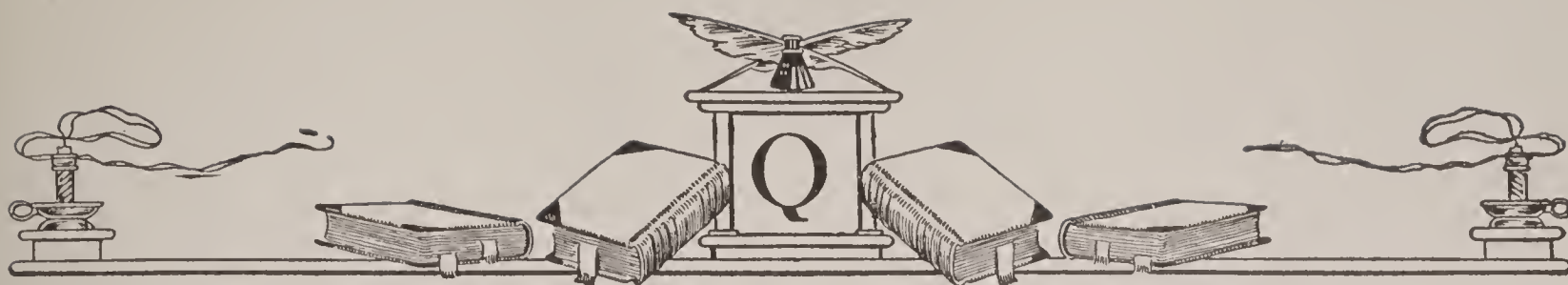
PYTHON, in mythology, a great serpent that came from the slime of Deucalion's Flood. It lived in the cave of Mount Parnassus, which no one approached without being killed. Apollo finally killed it with his golden darts. It is supposed that the python represented the unhealthy pools and marshes, while Apollo, the sun, dried up these swamps with his rays. The slayer of the python is represented by the statue of Apollo Belvedere.

PYX (pīks), the vessel used in the Roman Catholic Church to contain the consecrated wa-

ter that remains after service. It is shaped like a cup and is closed with a cover of the same material. The interior is either of pure gold or is plated with gold. Formerly the pyx was made in the form of a dove and hung suspended over the altar.

The name pyx is applied to a strong box used in the mint to deposit specimens of the coinage. The coins kept in the pyx are examined by a commission of experts for the purpose of testing their accuracy as to weight and fineness. In Great Britain at least one examination is made every year by a jury of goldsmiths, and this examination is called the *trial of the pyx*. A similar examination is made in February at the mint in Philadelphia. It takes place before the judge of the district court of the United States for the eastern district of Pennsylvania, the assayer of the New York assay office, the comptroller of the currency, and other persons appointed by the President.

PYXIE (pīks'ī), a small shrub native to North America, found in the region from Maine to North Carolina. It is a creeping or trailing plant and thrives best in a moist and sandy soil. The flowers are pink and white and appear early in spring. The plants grow wild, but they yield choicer flowers under cultivation.



Q

QUADRUPLE ALLIANCE

Q, the thirteenth consonant and seventeenth letter of the English alphabet. It has only one sound, that of *k* or hard *c*, and is always followed by *u*. It is used mostly as an initial letter of a word and never as the final letter. Since its office could be filled by *kw* or *k*, it is superfluous in English. The Anglo-Saxons did not use it, its sound being expressed by *ew* or *cu*, but later adopted it from the Latin-French. It is so named from the French word *queue*, meaning *tail*, its form being an O with a tail attached.

QUACKENBOS (kwäk'ën-bös), **George Payn**, educator, born in New York City, Sept. 4, 1826; died in New London, N. H., July 24, 1881. He graduated from Columbia College in 1843, entered upon the study of law, but soon after became principal of a collegiate school in New York City. From 1848 to 1850 he was editor of the *Literary Magazine* and edited several treatises and dictionaries of foreign languages. Though a successful educator, he is best known by a large number of school text-books written by him and published under his direction. Among them are "Advanced Course of Rhetoric and Composition," "Natural Philosophy," "School History of the United States," "Language Lessons," and several series of text-books of arithmetic and English grammar.

QUADRANT (kwöd'rānt), in astronomy, an instrument for measuring altitudes, so named because of its being graduated on a scale of 90°, the quarter of a circle. It consists of a graduated arc of 90°, with a movable radius for measuring angles on it, and has been largely superseded by the mural circle and the meridian circle. However, it is still used to some extent on shipboard to measure the altitude of the sun, but there it is giving place to the *sextant*, an instrument quite similar in principle and application. The quadrant is giving way to the other instruments named because it is less adapted than they are to secure reasonable exactness of the whole arc.

QUADRIGA (kwöd-rī'gā), the name of a Roman car or chariot drawn by four horses abreast. It came into use during the Olympian games of Greece, but was later adopted by the Romans for races and performances in the circus.

QUADRILATERAL (kwöd-rī-lăt'ēr-əl), in military science, a combination of four fortresses, so situated that each may effectually support the others in case of an attack. Fortresses located in this manner make it necessary that an enemy employ a large army to attack successfully the combined position. The most remarkable quadrilateral is situated in the northern part of Italy and includes the four fortresses of Legnago, Mantua, Peschiera, and Verona. These form a powerful barrier in the northern plain of the Po River. They were important in the wars between Austria and Italy and when that section was invaded by Napoleon III. in 1859. The Polish quadrilateral is a similar combination of four defensive forts maintained by Russia in Poland.

QUADRILLE (kwā-drīl'), in French, *square*, the name of a dance of French origin, so called because the dancers are arranged into squares, each consisting of four couples. It originated in the 18th century and is in extensive use in Europe and America. The movements are consecutive, generally five in number, and are directed by a caller and accompanied by music.

QUADRUMANA (kwöd-rū'mā-nā), the name of a division of mammals which include the apes, monkeys, and lemurs, so called from their having a grasping hand on each of the four extremities. In this respect they are distinguished from the *Bimana*, or the human races, in which only the fore limbs have hands. However, they are usually classed with the true quadrupeds. They are almost exclusively confined to the tropical regions and feed principally on vegetable food in a state of nature. While the chimpanzee and gorilla approach the human types of organization, the lemurs and others seem to form an immediate place between the bats and the carnivora.

QUADRUPLE ALLIANCE (kwöd'rū-p'l), the name applied to several alliances formed by various European states with a view of counteracting political tendencies or promoting compliance with recognized treaties. The triple alliance contracted by Austria, France, and England, in 1718, was converted into a quadruple alliance the following year by Holland joining the contracting parties. It was occasioned by

Spain seizing Sardinia, in 1717, and Sicily, in 1718, contrary to the terms of the Peace of Utrecht, and because Alberoni, the ambitious minister of the Spanish king, planned to acquire the throne of France for Spain and to influence the accession of the house of Hanover in England. Spain was compelled to abandon all these designs after a prolonged conflict of arms. The quadruple alliance formed by Prussia, Austria, Russia, and England, in 1814, was occasioned by the ambition of Napoleon I., and was one of the causes of the dissolution of the French Empire.

QUAESTOR (kwēs'tör), the title of certain magistrates of ancient Rome, whose offices were established in the early period of the Roman kingdom. The duties pertaining to the office included management of the public treasury, the receipt of tribute and taxes, and the payment of moneys on account of public service. Patricians were at first the only persons eligible to the office, but in 421 B. C. the number was increased from two to four, and the plebeians became eligible to service. With the annexation of acquired territory the duties of the quaestors were multiplied, and the number was increased accordingly. At the beginning of the First Punic War eight quaestors were provided for, and these were increased to twenty by Sulla and to forty by Julius Caesar.

QUAGGA (kwäg'gä), an animal of the horse genus, native to South Africa, but now extinct or assimilated with the zebra. This class of



QUAGGA.

animals differed from the zebra in being stronger and heavier and in having no stripes on the limbs, though the head and neck closely resembled those of the zebra. The color was a dark reddish-brown on the upper parts, with white bands on the head and neck, and a black line running along the spine. They had no warts on the hind legs, the mane was short and upright, and at the shoulders they were about four feet high. The lower parts of the body were white, but there were bars of a brown or black tinge at the upper parts of the legs. They were so named from the voice, which somewhat resembled the bark of a dog. They did not

generally associate with the zebra, but, since they were gregarious in habits, the remaining numbers joined the herds of zebras. Formerly many quaggas roamed on the plains of South Africa. They became extinct on account of their skins being valuable in the manufacture of boots and shoes, for which they were hunted by the Boers and other European settlers.

QUAIL, a class of birds of the partridge family, differing from other partridges mainly in being smaller and having longer wings and



COMMON QUAIL.

a shorter tail. They are capable of enduring flight more successfully than the grouse. The average length of the body is about seven inches, but they differ greatly in size, ranging from the large species of Europe to the small quails, about four inches in length, found in China. Twelve American species have been described, the best known being the common quail, which is sometimes called *bobwhite*. The latter name is applied because of its call note. It is mainly reddish-brown in color, with mottled markings of a darker hue, and is about ten inches long. Its claws are acute and slightly curved. Another American species, the *California quail*, is found mostly in Mexico and the southwestern part of the United States. It is known for its crest of a few feathers. The common quail of Europe is migratory, but those of North America do not migrate. Quails feed on grain, seeds, and insects. The young brood is guarded carefully by the mother, though in habit quails are somewhat quarrelsome among themselves. The female builds a nest in the ground, where from eight to fifteen eggs are laid. They never perch in trees, but rest on the ground at night and seek shelter in the winter by gathering in packs under shrubs, grasses, and vines. The flesh is considered a great delicacy on account of its fine flavor and tender qualities. From its note, the quail is commonly called Bobwhite.

QUAKERS (kwāk'ērz), or **Society of Friends**, a Protestant sect founded in England by George Fox in 1648. The founder was a man of zealous devotion and pure life, and, after preaching for some years in churches and public places, gathered about him a large number of preachers, who assisted in promulgating

his doctrines. Many persecutions were perpetrated upon him and his devoted followers, and some were even transported to penal colonies by the authorities, but through persevering efforts the doctrines secured a strong foothold in Great Britain and America. At first no particular organization and discipline were adhered to, but such scholarly and learned men as William Penn and Robert Barclay not only stimulated organization, but took an important part in their colonization in the New World, especially in Pennsylvania and New Jersey. The Quakers have not been particularly numerous, either in Europe or America, but their purity of life and firm and uncompromising position on various important questions have given them a wholesome influence in public affairs.

Among the doctrinal tenets of the Quakers is the view that the spirit of God is revealed immediately to each soul, a doctrine founded chiefly on passages in the first chapter of the gospel of Saint John, where the Word is spoken of as the life and light of man, and as "the true Light, which lighteth every man that cometh into the world." Thus, it is held that this light comes both to the heathen and the Christian, and manifests the love and grace of God toward all mankind. They deny the necessity of the practice of the sacraments of baptism and the Lord's supper; maintain no stated ministry, holding that the form of worship in which a person waits in silence and patience upon God is best; and practice remarkable simplicity in their dress, speech, household furniture, marriages, and funerals. Much stress is laid upon earnestness and honesty, holding their members duty bound to pay their debts in full, even after having been released from legal payment by bankruptcy or the statutes of limitation. In the main they agree with other sects in the doctrines of Christianity, holding the Scripture as proceeding from the spirit of God and believing in the Father, Son, and Holy Spirit. They accept the atonement of Christ and believe in sanctification by the spirit. The Quakers have been consistent in supporting every form of temperance and in opposing slavery and war.

At present there are four principal divisions of Quakers, known as Orthodox, Hicksite, Wilburite, and Primitive Friends. The *Orthodox Friends* represent the original organization and are the most numerous. At present they have 840 churches, 1,290 ministers, and 95,000 church members, distributed more or less over the United States, but numerically strongest in Indiana, Iowa, Kansas, and Ohio. The *Hicksite Friends* comprise a division organized in 1827 by Elias Hicks, who held that all the Scriptures are not inspired and denied the spiritual conception and divinity of Christ. Fully one-half of the American Quakers followed his leadership and at present the division includes 115 ministers, 210 churches, and a membership of 22,850. The *Wilburite Friends* are followers of John Wil-

bur of Rhode Island, who, in 1843, dissented from the Orthodox Friends on the ground that their position inclined too much toward the evangelical. They maintain 53 churches and 40 ministers and have 4,500 members. The *Primitive Friends* claim to adhere most closely to the primitive customs of the society. They have 10 churches and 12 ministers and their membership is about 250.

The most recent reports show that the Quakers of the United States maintain eight institutions of learning, with 95 professors, 850 students, and endowment funds amounting to \$1,500,000. Their principal educational institutions are Haverford College, near Philadelphia; Swarthmore College, near Philadelphia; Bryn Mawr College; and smaller institutions at Wilmington, Ohio, Richmond, Ind., Oskaloosa, Iowa, and Newberg, Ore. They have effective missions in China, Japan, India, Syria, Madagascar, and the West Indies. Their periodicals include the *Christian Worker*, *Friends' Intelligencer*, and *Friends' Review*. Quakers are disposed to be in favor of peace and good will, maintain a simple body government, and have four classes of meetings, known respectively as preparative, monthly, quarterly, and yearly. In these all matters of discipline and government are discussed. The ministry depends largely upon individuals being moved by the spirit.

QUAMASH (kwöm'āsh), or **Biscuit Root**, a plant of the lily family, closely allied to the hyacinth. It bears purple flowers, has an erect stem, and yields a bulb of considerable size. These bulbs are a nutritious food with an agreeable taste and are eaten after being roasted by the Indians. Several species of quamash are found in the western part of North America, especially on the prairies.

QUAPAW (qwä'pā), a tribe of North American Indians, belonging to the Sioux family. They speak a dialect of the language spoken by the Kaw, Omaha, and Osage tribes. Formerly they occupied a large region along the lower Mississippi, from the mouth of the Ohio to the Gulf of Mexico. In an early date of the Louisiana Colony they were allies of the French. At present they number a few hundred and are on reservations in Oklahoma, but they are mixed largely with other tribes.

QUARANTINE (qwör'ān-tēn), an enforced isolation of any place or person infected with a contagious disease. The term originally implied isolation for a period of forty days. Quarantine regulations were first established in Venice about 1448. For many years it was customary in the leading ports of the world to inspect vessels coming from foreign or adjacent ports and to make an examination of their sanitary conditions. Ships found infected with epidemic diseases were required to forbear all intercourse with the port at which it arrived for forty days, but now the length of time varies according to the circumstances of the

case, and is dependent upon the time in which all danger of infection passes away. A yellow flag is displayed from the head mast of a vessel under quarantine, while at night a white light is displayed similarly. National quarantine stations were established by the United States in 1888, and an act of Congress makes violations of their regulations punishable by fine or imprisonment, or both. Protection against contagious diseases in cities, towns, and minor divisions is vested under the general laws of the states or provinces in the local boards of health, which have power to establish quarantines in their respective districts.

QUART, a measure of capacity, both dry and liquid, in the English system of weights and measures. In dry measure it contains 67.2 cubic inches, is divided into two pints, and is the eighth part of a peck. The quart in liquid measure contains 57.75 cubic inches, is divided into two pints, and is the fourth of a gallon.

QUARTERMASTER (kwā'tēr-mās-tēr), in military usage, an officer of a regiment or other body of troops, usually ranking as first lieutenant, in whom is vested the duty of assigning quarters, arranging camps, providing and issuing clothing and provisions, and furnishing storage and transportation. The quartermaster in the navy is a petty officer who assists the navigator and attends to the steering of the vessel, the compasses, signals, signal apparatus, lights, and other matters under the direction of a master.

QUARTET (kwā-tēt'), a musical composition for four voices or four instruments, written on the *obligato* plan; that is, each part is necessary to maintain the effect of the whole composition. The ordinary instrumental quartet is arranged for the first and second violin, a viola, and a violoncello. Three recognized quartets of singers are in general use, which are called respectively the mixed, male, and female quartets. The *mixed quartet* consists of the soprano, alto, tenor, and bass; the *male quartet* is made up of the first and second tenor and first and second bass; and the *female quartet* comprises the first and second soprano and the first and second alto. Haydn originated the quartet. Many compositions classed as quartets were later written by Mozart and Beethoven. Other great masters adding to this line of music are Schubert, Mendelssohn, Schumann, Spohr, and Brahms.

QUARTZ, a native oxide of silicon, which occurs either in a massive or crystalline state and varies greatly in luster, transparency, and color. It is diffused abundantly throughout nature in both states. In the massive state it is not pure silex, containing various foreign substances, but in the crystalline state it is pure, and is formed of six-sided prisms, terminated by a pyramid at each end. Among the most abundant colors are gray, white or milk, purple, reddish, green, blue, and brownish. It abounds

in rocks and is an essential element of granite. Quartz is infusible in the blowpipe flame and resists all acids except hydrofluoric. It is positively electrified by friction and scratches glass readily, and two pieces may be rendered luminous by rubbing them together in the dark.

Particular names are applied to the principal varieties of quartz, such as common quartz, rose quartz, smoky quartz, milky quartz, rock crystal, yellow quartz, blue quartz, fat quartz, amethyst, hornstone, flint, floatstone, carnelian, Lydian stone, radiating quartz, chalcedony, sapphire quartz, and agate. Quartz enters largely into the manufactures and arts, being employed for making cups, chandeliers, optical instruments, several kinds of glass, and seals. It is important in the manufacture of pottery and porcelain of different kinds, for which purpose it is made into a powder. Quartz veins occur in metamorphic rock, and contain more metals than the masses of rocks through which they are distributed. Gold is found principally in quartz veins or in alluvial sands and gravel, but the quantities taken from alluvial deposits are mere fragments carried by weather and climatic conditions from their natural deposits in quartz veins.

QUARTZITE (kwārtz'it), a mineral composed principally of quartz, forming a metamorphic rock. It originated from the alteration of sandstone, the grains of which were enlarged by the addition of silica while in a partial state of solution. This gives the appearance of a solidified and uniform rock, but the original rounded surface of the sand grains is revealed by the microscope. In many specimens are traces of iron, mica, and felspar.

QUASSIA (kwōsh'ī-ā), the name of a small tree native to the West Indies and tropical America, so named from Quassi a Negro who



QUASSIA: FLOWER AND PLANT.

recommended the bitter bark as a remedy for fever. The bark of the quassia was introduced as a medicine into Europe about the middle of the 18th century, and is now used extensively as a tonic in cases of gastric debility and as a substitute for hops in making beer. When taken in excessive doses, it produces narcotic and irritant effects and sometimes causes vomiting. The wood is useful in cabinetmaking, since it is free from attacks by insects. The quassia bark and products sold in the market are obtained

chiefly from Venezuela, Panama, northern Brazil, and Guiana.

QUATERNARY PERIOD (kwà-tēr'nà-rŷ), the division of time which embraces the post-tertiary strata. It is frequently referred to as the *Age of Man*, since it is coextensive with the period of the existence of mankind. In the classification of some writers the terms Quaternary and Pleistocene are used synonymously, while others divide the Quaternary into the two periods of Pleistocene and Recent. See **Geology**.

QUAY (kwā), **Matthew Stanley**, statesman, born in Dillsburg, Pa., Sept. 30, 1833; died May 28, 1904. He graduated from Jefferson College in 1850, became a member of the bar in 1854, and entered the United States army at the beginning of the Civil War, attaining the rank of colonel. From 1865 until 1867 he served as a member of the Pennsylvania Legislature. He was Secretary of State from 1873 to 1878 and recorder of Philadelphia from 1878 until 1879. He became State treasurer in 1885 and was elected to the United States Senate in 1887, serving in that capacity with considerable distinction for many years. In 1899 he was brought to trial on the charge of having used State funds for personal profit, but the jury rendered a verdict of not guilty. However, the members of the Legislature were unable to agree upon reelecting him to the United States Senate and adjourned without making a choice, but Governor Stone immediately appointed him to that position. In 1901 he was again elected Senator by the Legislature. Quay was long an influential factor in the Republican party and attended many of its national conventions in an official capacity.

QUAYLE (kwāl), **William Alfred**, pastor and educator, born in Parkville, Mo., June 25, 1860. His parents came to the United States from the Isle of Man. In 1885 he graduated at Baker University, Baldwin, Kan., where he was professor of literature and Greek from 1887 to 1890. In the latter year he was made president of that institution and, after serving efficiently for two years, he resigned to accept a pastorate in the Saint Louis conference of the Methodist Episcopal Church, and as pastor held important charges at Kansas City, Indianapolis and Chicago, being elected bishop while holding the last mentioned charge. His literary work includes "A Hero and Some Other Folks," "In God's Out of Doors," and "The Blessed Life."

QUEBEC (kwê-bĕk') the capital of the Province of Quebec, in Quebec County, at the junction of the Saint Charles and Saint Lawrence rivers. It is situated about 300 miles from the Gulf of Saint Lawrence, 175 miles northeast of Montreal, and is the focus of numerous railroads, including the Canadian Pacific, the Grand Trunk, the International, and other lines. The city occupies a promon-

tory on the northeastern bank of the Saint Lawrence, known as Cape Diamond, and extends partly into the lower valley of the Saint Lawrence. The highest point is 342 feet above the river and near it are a citadel and many fine residences. Access to this portion of the city is by an elevator, several flights of steps, and a steep but beautiful street. Trade and commerce are centered in the lower part of the site, and near the business section are the manufacturing districts of Saint Roch and Saint Sauveur.

DESCRIPTION. The architecture of Quebec is substantial and of good material, though many of the streets resemble those of Europe rather



QUEBEC AND VICINITY.

than the usual American thoroughfares. The public gardens and walks are in the upper part of the city, which contains the principal residences and churches. Dufferin Terrace, a promenade 1,400 feet long, is about 200 feet above the river and affords a fine view. The Governor's garden, located back of the promenade, overlooks the Saint Lawrence River and contains a monument erected to the memory of Wolfe and Montcalm. The suburb of Saint John is located west of the city, and near it are the Plains of Abraham. The last mentioned locality is famous as a battle ground in 1759, when General Wolfe lost his life at the point of victory. This event is commemorated in a column forty feet high. Other localities of interest include Montmorency Falls, where a battle between Montcalm and Wolfe took place; the Chaudière Falls; the three forts of Levis; Saint Anne de Beaupre, which contains a noted church; and Beauport and its asylum.

PUBLIC UTILITIES. Communication is furnished by an extensive system of electric railways, which has lines to many suburban and interurban localities. The pavements are constructed largely of a fine grade of gray limestone, which is quarried in the vicinity, and

many of the streets are macadamized. Power to propel the electric lighting plant and other establishments is obtained from Montmorency Falls, about six miles distant. Lake Saint Charles supplies the city with water through an extensive system. Other public utilities include gas lighting, sewerage, drainage, and a public library with a fine collection of books and pamphlets.

BUILDINGS. Quebec is the seat of Laval University, founded in 1663, and has many other educational and scientific institutions. Those of note include Morrin College (Presbyterian), which is connected with McGill University at Montreal, the Laval Normal School, the Ursuline Convent, which has a tract of beautiful grounds, and the Marine Hospital. It has many academies, high schools, and public and private schools. The leading churches include the First Methodist Church, the Anglican Cathedral, the Roman Catholic Basilica, the Saint Andrews' Presbyterian Church, and a number of others. The basilica mentioned above has a seating capacity for 4,000 people and contains paintings from many artists, including Ceracci and Van Dyck. The most prominent public secular buildings include the houses of Parliament, the county courthouse, the city hall, the Masonic Hall, the armory, and the customhouse. Many of the office and business blocks are of modern construction.

INDUSTRIES. Quebec is the seat of a large domestic and foreign trade. It has a safe harbor with wharves on both rivers for the accommodation of the largest vessels. At the mouth of the Saint Charles is the spacious Louis Basin, which is inclosed by the Louis Embankment, forming a fine promenade on the river front. Lumber, grain, hides, and merchandise are shipped in large quantities. The manufactures include boots and shoes, leather, cutlery, hardware, clothing, rubber goods, and steel and iron products. Shipbuilding is an important enterprise. Levis, across the Saint Lawrence, is connected with Quebec with a fine cantilever bridge.

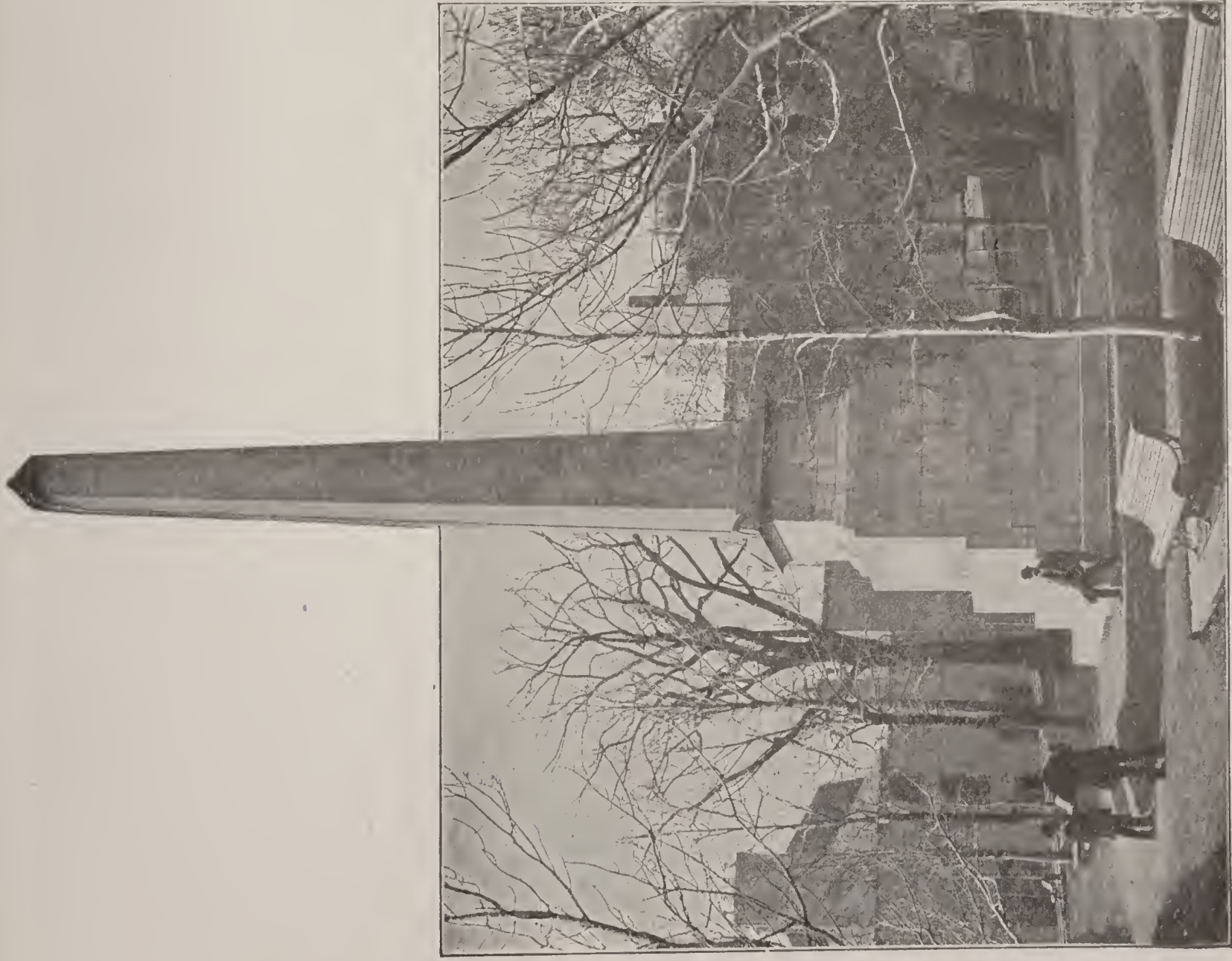
HISTORY. The site of Quebec was occupied by an Indian town called Stadacona in 1535, when the Saint Lawrence was explored by Jacques Cartier. Champlain founded the city in 1608, while exploring that region for France, and it was named Quebec by its founder. Sir David Kirke captured the settlement in 1629 for the English, but it was restored to the French in 1632. The colony was made a royal government in 1663, when Quebec became the capital. In 1759 General Wolfe gained his famous victory on the Plains of Abraham, and since that time the city has been a part of the British Empire. The Americans made an unsuccessful attempt to capture it in 1775, when General Montgomery was slain. It was the capital of Canada a number of years, but the capital was removed to Ottawa in 1858. About five-sixths of the inhabitants are of French

descent, hence the French language is spoken very extensively. Population, 1921, 95,193.

QUEBEC, a province of the Dominion of Canada, formerly known as Lower Canada. It is bounded on the north by Hudson Strait, north-east by the coast of Labrador, southeast by the Gulf of Saint Lawrence, New Brunswick, and Maine, south by New Hampshire, Vermont, New York, and Ontario, and west by Ontario and Hudson Bay. The length from north to south is about 2,500 miles and the extent from east to west is 998 miles. It is separated from Baffinland by Hudson Strait and from Newfoundland by the Strait of Belle Island. The area, including a number of coast islands, is 706,262 square miles, of which about 5,800 square miles are water surface. This area includes the addition of 1912, when all of Ungava was annexed, giving it the form of a vast peninsula.

DESCRIPTION. The surface is greatly diversified and in many localities the natural aspects are wild and grand. The Acadian region of Quebec lies south of the Saint Lawrence River, which includes a part of the Appalachian Mountains, known here as the Notre Dame and the Shickshock mountains. They extend along the south side of the Saint Lawrence, from the vicinity of Quebec to the Gulf of Saint Lawrence and comprise the predominating system. Their general elevation is about 1,500 feet, but they rise in places to heights ranging between 3,000 and 4,000 feet. This mountainous section is in part a wilderness that is exposed to summer frosts. A region of lowlands extends along the north side of the Saint Lawrence, from Quebec to the city of Ottawa, Ontario, and embraces an area of about 10,000 square miles. It is a plain from 300 to 400 feet above the sea and comprises a fertile area dotted with lakes. The northern part of Quebec is included in the Laurentian Mountains, or Laurentides, which stretch from Labrador to Ontario, forming the principal divide between the rivers that flow into the Saint Lawrence and its tributaries and those that enter James Bay and Ungava Bay. This section has an altitude of from 800 to 1,700 feet and much of it is either hilly or broken.

The Saint Lawrence is the most important stream. It enters the Province from the southwest and passes entirely through it in a direction toward the northeast, entering the Gulf of Saint Lawrence by an extensive estuary. Within the Province of Quebec it receives the Ottawa, the Saint Maurice, the Saguenay, the Bastard, the Chaudière, the Saint Francis, and the Richelieu. A large section in the northwestern part is drained into James Bay by the Ruperts, East Main, Nottaway, and Harricanaw rivers. The Northwest River drains the eastern part into the Strait of Belle Island. The beautiful sheets of water include Lake Mistassinni, Saint John, and Peretibbe. At the mouth of the Saint Lawrence is the island of Anticosti, which



THE WOLFE AND MONTCALM MONUMENT, QUEBEC

One of the oldest of the monuments in Quebec is the plain shaft erected in 1827 to the memory of Wolfe and Montcalm, who battled so bravely in the long ago and by a single struggle added their names to the world's roll of illustrious military heroes. The monument stands in the Governor's Garden, not far from the Dufferin Terrace.

Art. Quebec)



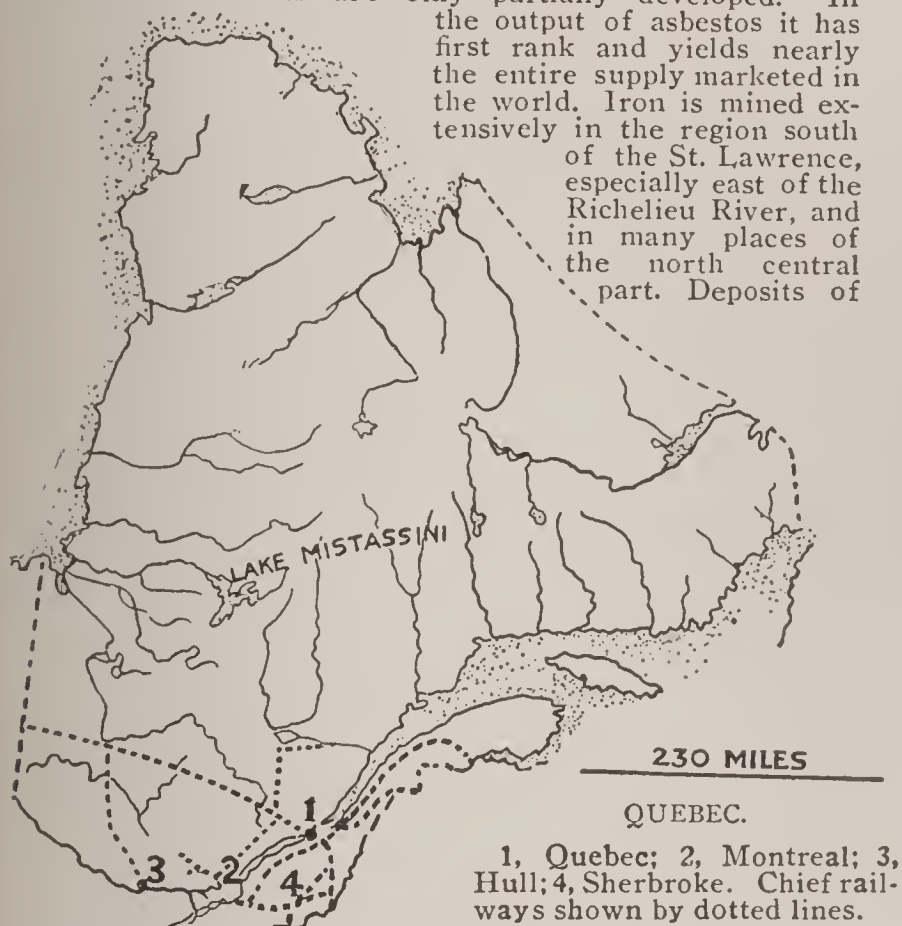
CHAMPLAIN MONUMENT, QUEBEC

At the north end of the Dufferin Terrace rises the splendid statue of Champlain, the founder of Canada, unveiled as recently as 1898. No hero of American discovery is more deserving of such honor than the resourceful captain who planted French civilization on the banks of the St. Lawrence and opened new pathways across the wilderness beyond.

is 140 miles long and 30 miles wide. Fine forests of hemlock, pine, cedar, oak, elm, spruce, birch, beech, and other woods are abundant.

The climate is healthful, but the winters are long and cold, when the thermometer often falls to 20° below zero. In summer it is warm but not excessive, and the temperature quite frequently approaches 90°. The mean annual temperature is 45° at Montreal and 29° in the northern part. Sufficient rain falls for the germination and maturity of all crops. Heavy snows occur in the winter, when sleighing continues fully five months. The spring is mild and pleasant and the autumn is long and healthful.

MINING. Quebec is particularly rich in minerals, but the resources are only partially developed. In the output of asbestos it has first rank and yields nearly the entire supply marketed in the world. Iron is mined extensively in the region south of the St. Lawrence, especially east of the Richelieu River, and in many places of the north central part. Deposits of



gold and platinum occur in the same fields, but the output is not large. In the basin of the Ottawa are deposits of mica, plumbago, phosphate, and lead. Although coal does not exist, the Province has an inexhaustible supply of peat, but the product is not used outside of small localities. Many building stones are abundant, such as granite, marble, and limestone. Clays suitable for pottery and brick are widely distributed.

AGRICULTURE. A large majority of the people are engaged in agricultural pursuits. The portion lying along the Ottawa and Saint Lawrence rivers are the most fertile, but large tracts suitable for farming and grazing are abundant in the river valleys. Wheat, oats, barley, rye, hay, and buckwheat are the leading crops. Extensive interests are vested in growing tobacco and vegetables, especially potatoes, turnips, celery, carrots, and sugar beets. Apples and grapes of a fine flavor are grown in the southern part, and small fruit is raised successfully in all sections where settlements have been established. Cattle are reared profitably for meat and dairy purposes. Other domestic animals include

horses, sheep, swine, and poultry. Formerly the Province was looked upon as poorly suited for agriculture, but experience has demonstrated that it possesses unexcelled resources for diversified farming.

MANUFACTURES. The industrial enterprises are numerous and diversified, owing chiefly to extensive natural resources. Large quantities of fine timber are available, including, oak, beech, white pine, spruce, cedar, walnut, and hickory. Lumber is sawed both for exports and for material in manufacturing enterprises, such as making doors, furniture, and farming machinery. The fisheries yield a large output of lobster, cod, salmon, and herring, and these are cured and canned in large quantities. The manufacture of furs is important, a large supply of the material being obtained from the fur-bearing animals native to the Province, such as the mink, beaver, bear, caribou, and muskrat. Boots and shoes, tobacco products, cotton and woolen goods, chemicals, leather, paper, and steam and agricultural machinery are made in large quantities. Butter and cheese factories are operated in nearly every parish and the product is unrivaled in quality.

TRANSPORTATION AND COMMERCE. Large ocean steamers ascend the Saint Lawrence as far as Montreal, and smaller streams, such as the Ottawa and the Saguenay, furnish river transportation into the interior. James Bay and the Atlantic are navigated a part of the year. Railway building received early attention under aid by the Province and the lines now have a total of 4,125 miles. The principal railways include the Canadian Pacific, the International, the Grand Trunk, and the Quebec and Saint John railroads. Electric railways are operated in the cities and many rural districts. Telephone and telegraph lines are used extensively in all sections. Navigation is facilitated by 125 light stations, 160 lighthouses, and numerous lightships.

Quebec has commercial advantages over every other Province of Canada, since its seacoast may be said to extend from its eastern extremity to Montreal. The natural advantages in commerce have been extended by the construction of numerous canals to overcome obstructions in the smaller rivers, such as the Grenville Canal, which overcomes the rapids in the Ottawa River, the improvement at Saint Ours to render the Richelieu navigable from the Saint Lawrence to Lake Champlain, and the canal that connects this lake with the Hudson River in the United States. The Lachine Canal, about eight miles long, carries vessels around the Lachine Rapids and overcomes the rise between Montreal and Lake Saint Louis. The rise between Lake Saint Louis and Lake Saint Francis is avoided by the Soulanges Canal, which avoids the Cedar, Cascades and Cateau rapids. These canals, that is, the Lachine and the Soulanges,

contribute to admit navigation from Montreal to the Great Lakes. The trade outside of Canada is largely with Great Britain and the United States. Among the exports are lumber, live stock, fish, asbestos, and dairy products. The imports include coal, raw cotton, and manufactured goods.

GOVERNMENT. Executive authority is vested in the Lieutenant Governor, who is appointed by the Governor General of Canada and is assisted by an executive council of seven members. Both the Governor General and the council are responsible to the General Assembly. Legislative authority is intrusted to the Legislature of two chambers, the legislative council of 24 members and the legislative assembly of 74 members. The former are appointed for life, while the latter are elected every five years by popular suffrage. Both the system of courts and the local government are administered under the French plan of administration, which is a privilege guaranteed at the time Quebec was made a part of the British Empire. At the time of the Confederation it was agreed that Quebec is to be represented in the Dominion House of Commons by not less than 65 members, which is the number at present, and it is represented in the Senate of the Dominion by 24 members.

EDUCATION. Although a general system of public education is maintained, it differs from those of the other provinces in the Dominion in that the schools for Protestants and Catholics are separate from each other. A superintendent of public instruction is at the head of the schools, but the administration is represented by two committees, one each for the Protestant and Catholic inhabitants. Both receive support from the public funds, but the religious instruction differs according to the respective courses of study prescribed. Local boards have general charge of the individual schools. In 1908 the Province had 985 Protestant and 4,995 Catholic schools. Attendance upon the schools is free and compulsory for a prescribed period. Special attention is given to the study of agriculture.

Laval University, located at Quebec, is a Catholic institution, but a Protestant branch is maintained at Montreal. Other institutions of higher learning include the Bishop's University, Lennoxville; the McGill University, Montreal; the Laval Normal School, Quebec; the Polytechnic School, Montreal; the Wesleyan Theological College, Montreal; the Congregational College of Canada, Montreal; the Stanstead Wesleyan College, Stanstead; the Presbyterian College, Montreal; and the Montreal Diocesan Theological College, Montreal. Ample provisions have been made by the Province for the care of the incorrigible and unfortunate. Many charities are maintained for the care of the aged, infirm, and dependent.

INHABITANTS. Quebec was originally settled by the French and the inhabitants consist largely of French-Canadians. In language, manners,

and temperament this class is French. Much of the architecture as well as the habits of dress and the tendencies in social life are French rather than American. The greater number of inhabitants are Roman Catholics, only about one-fifth being Protestants. The Episcopalians, Presbyterians, and Methodists are the strongest Protestant denominations. Although the increase in population has been comparatively small, it is greater than in any of the eastern provinces. About 10,700 Indians reside in Quebec. In 1921 the total population was 2,361,199. Quebec, on the Saint Lawrence, is the capital. Other cities include Montreal, Saint Henri, Hull, Sherbrooke, Levis, Montmagny, Three Rivers, and Saint Hyacinthe.

HISTORY. Jacques Cartier explored the Gulf of Saint Lawrence in 1534, when he claimed the Gaspé Peninsula as a dependency of France. Captain Champlain laid the foundations of Quebec in 1608, when he constructed a fortress on the promontory called Cape Diamond. It was little more than a trading post until 1617, when Louis Hébert and others began to develop farming. For many years the Indians were hostile to the advances of the whites and a force of English captured Quebec in 1629, but it was soon restored to its former owners. The royal governor was appointed by the King of France in 1663, exactly 100 years before the region was ceded to the British, in 1763.

An American army besieged Quebec in the American Revolution, but the people remained unfriendly to the invaders. Upper Canada was made a separate Province in 1791, when French-Canada, or Quebec, was organized as Lower Canada, which continued until 1841, when the union with Upper Canada went into effect. In 1867 the Confederation was organized, when both Quebec and Ontario became provinces in the Dominion of Canada. Since that time the Province has had an almost unbroken period of growth and progress. In 1912 the district of Ungava was annexed to Quebec, making it the largest Province in the Dominion.

QUEBEC, Battle of, an important battle near the city of Quebec, on the Plains of Abraham. The French under Montcalm, numbering 16,000, held the heights on the north bank of the river and fortified themselves in June, 1759. When General Wolfe seized the heights on the south, the French decided to adopt the defensive plan. The British extended the line of defense by moving their ships past the city, and later landed their forces and entrenched themselves on the French left. The assault at Montmorency and several other points proved futile, but the British gained a decisive advantage on Sept. 13 on the Heights of Abraham, where both Wolfe and Montcalm were killed. This defeat of the French not only caused them to lose Quebec, but their entire possessions in the northern part of America.

Another attack was made upon Quebec at the

beginning of the Revolution, which was a part of the scheme of the conquest of Canada. Benedict Arnold was sent against Quebec with an army by the way of Maine, while General Montgomery proceeded with another force by way of Lake Champlain and the Saint John's River. Arnold reached Quebec on Nov. 13 and Montgomery came on Dec. 3, 1775. The combined forces numbered 1,200 men. They made a systematic attack upon the town from opposite sides on Dec. 31, 1775, but were repulsed with considerable loss. Arnold was severely wounded and Montgomery was slain, while General Morgan and a company of Virginia marksmen were taken prisoners. The expedition proved an entire failure.

QUEBEC ACT, an act of the British Parliament, in 1774, which was passed to prevent the Province of Quebec from joining the American colonies in the Revolutionary War. This act extended the boundaries of Quebec so as to include all the Northwest Territory, guaranteed to protect Roman Catholicism as the dominant religion, and permitted the institution of the French civil law. Since the thirteen colonies were almost entirely Protestant, they looked upon this act with indignation.

QUEEN, the wife of a king, or the female sovereign of a kingdom. In some monarchies women are excluded from the throne by the Salic law, but in England the succession devolves upon the eldest daughter or female heir apparent, if a deceased sovereign has left no male heir apparent. A *queen consort* is the wife of a reigning king; a *queen dowager* is the widow of a deceased king; and a *queen regent*, or *queen regnant*, is a sovereign princess who has succeeded to sovereign power and holds the crown in her own right.

QUEEN CHARLOTTE ISLANDS, an island group in the Pacific Ocean, off the coast of British Columbia, situated north of Vancouver Island. The group includes a large number of islands, but only two are of material importance. These are Graham Island and Moresby Island, which stretch from northwest to southeast a distance of 160 miles. They are separated from each other by a narrow channel called the Skidegate Inlet. The former has an area of 3,000 square miles and the area of the latter is placed at 1,500 square miles. Graham Island has a width of 70 miles at the northern extremity, and thence the land mass gradually narrows toward the southeast. The climate is moist, but healthful, and the islands have a considerable growth of magnificent forests. An abundance of minerals occurs in the islands, including iron, copper, anthracite coal, and gold-bearing quartz. By far the largest part of the inhabitants are Indians, who engage in hunting and fishing. The islands belong to the Province of British Columbia.

QUEEN CHARLOTTE SOUND, a channel of the Pacific Ocean, which separates the

northern part of Vancouver Island from the mainland. It contains many islands, and numerous coast indentations extend from it toward the north and east. Edible fish, especially salmon, are abundant.

QUEENSBERRY, John Sholto Douglas, public man, born in England, July 20, 1844; died in London, Jan. 31, 1900. He succeeded his father as marquis in 1858 and the following year entered the army, serving until 1864. In 1872 he became a member of the House of Lords, in which he took a more or less active part until 1880. His reputation is based chiefly upon his interests in sports and games. In 1860 he founded the Amateur Athletic Club. He took part in drawing up the *Queensberry Rules*, in 1867, and these are now the basis for contests in boxing and pugilistic exhibitions.

QUEENSLAND, a State of Australia, located in the northeastern part of that continent. It is bounded on the north by the Gulf of Carpentaria and the Pacific, east by the Pacific, south by New South Wales, and west by South Australia. The length from north to south is 1,260 miles, and its greatest width is 940 miles. It has a seaboard of 1,250 miles, being greatly enlarged by the extension of the Cape York peninsula toward the north. The area is 668,497 square miles.

DESCRIPTION. The Great Dividing Range, which extends along the entire eastern coast of the continent, runs parallel to the coast at a distance of 70 to 100 miles from the sea. From it numerous spurs extend in various directions. The highest peaks range from 3,000 to 5,750 feet above sea level. The coast region is generally fertile and has an abundance of timber, but the interior and western parts are generally dry and treeless. Chains of islands lie off the eastern coast, which is indented by numerous small bays, including Moreton Bay, the harbor of Brisbane. East of the mainland is the Great Barrier Reef, which is formed largely of coral and is from 20 to 150 miles from the coast. The sheet of water inclosed by it is about 1,000 miles long and contains numerous islets.

The drainage of Queensland is chiefly toward the southwest by the head streams of the Murray River, which discharges into the Indian Ocean, and by streams flowing into the salt lakes in the State of South Australia, though the coast region is drained quite generally into the Pacific and the Gulf of Carpentaria. Among the principal rivers are the Warrego, Cooper, and Herbert, flowing toward the southwest; the Brisbane, Burnett, Fitzroy, Pioneer, and Burdekin, flowing into the Pacific; and the Mitchell, Gilbert, Flinders, and Gregory, flowing into the Gulf of Carpentaria. In the western part are extensive treeless plains, but the soil is fertile and produces grasses and shrubs. Here the moisture sinks in the dry ground or collects in lake basins, which evaporate during the dry season.

Queensland is located partly in the Torrid and partly in the South Temperate zones. The interior is not affected by sea breezes, hence has an extremely hot and dry climate. At Brisbane, on the Pacific coast, the temperature ranges from 30° to 60°, with an average of 70°. Here the rainfall is 50 inches, but farther north it ranges from 80 to 150 inches per year. In the western part the temperature is extremely hot and the atmosphere is dry. From five to seven inches of rainfall occur in this section, and all of the State lying west of the Great Dividing Range has an uncertain precipitation.

MINING. Gold is the most important mineral and the output has an annual value of about \$13,500,000. Copper and tin are mined in large quantities and the output of silver is considerable. Other minerals include mercury, lead, tin, antimony, coal, and salt. The output of coal has increased materially the last decade, owing to its larger use in manufacturing enterprises. Salt is abundant in the lakes and lagoons of the west, where it is deposited in large quantities when the water evaporates during the dry season. Metal mining is confined entirely to the mountain region. Granite, marble, sandstone, and limestone are widely distributed.

AGRICULTURE. Farming is confined largely along the coast, where the soil is fertile and the rainfall is abundant. Corn is the leading cereal, but it is followed closely by wheat, barley, oats, and rye. Sugar cane is one of the most important crops, and the cultivation of this plant is highly profitable on the rich lands at the mouths of streams flowing into the sea. Many species of tropical fruits, vegetables, and sugar beets are grown profitably. The culture of the silkworm and the mulberry tree has been introduced successfully. While stock is raised profitably on the coast plains, the larger interests in ranching are found in the region of the plains beyond the Great Dividing Range. Queensland exceeds all the other states of Australia in the number of cattle. It has very extensive interests in sheep raising. Other domestic animals include horses, swine, and poultry. However, the investments in cattle and sheep greatly exceed those of other live-stock industries, but the prevalence of drouths sometimes causes the loss of large herds through a lack of water and vegetable growth.

OTHER INDUSTRIES. Queensland maintains a large variety of industries, owing to its varied resources. The forests yield pine, cedar, rosewood, tamarind, myrtle, cypress, red cedar, and bamboos. Gigantic eucalyptus trees abound. It is estimated that about one-half of the surface was originally covered with timber, but the forests on the western slopes are thin or shrubby. Lumbering is a prolific source of income. Pearl fisheries along the coast are important and considerable interests are vested in catching shellfish and deep-sea fish. The manufactures include, sugar, flour, butter and

cheese, spirituous liquors, leather, paper, and lumber products. Woolen and cotton goods are the leading textiles. Large interests are vested in preserving and packing meat, especially beef and mutton.

TRANSPORTATION. The rivers are not navigable, but many safe harbors are afforded by estuaries and bays. An extensive coastwise trade is facilitated by the long coast line. Railway building is encouraged by the government and the lines in operation have a total of 3,800 miles. They are built largely from points on the coast to mines and trade centers in the interior, and several lines connect with the railway system in New South Wales and South Australia. Electric railways are operated in Brisbane and some interurban points. The exports exceed the imports. They include principally sugar, hides, wool, gold, lumber, and frozen meat. Textiles, clothing, machinery, and hardware are imported.

GOVERNMENT. The executive power is vested in a Governor appointed by the crown, who is assisted by an executive council of nine members, of whom eight hold portfolios. The Parliament consists of a legislative council of 44 members and a legislative assembly of 72 members. All members of the former body are appointed for life by the Governor on the advice of the ministry, while the latter are elected for three years by universal suffrage without regard to sex. The right to vote is based upon a residence of six months and the payment of a nominal tax on property. Local government is administered in the counties and towns, whose officers are elected by the people.

The State extends aid to maintain and extend a system of public education. School attendance is compulsory between the ages of six and twelve years and primary instruction is free and unsectarian. At the time of the last census, in 1901, the returns showed an illiteracy of only two per cent. among the adult white population. A number of charitable, correctional, and educational institutions are maintained at Brisbane and other places.

INHABITANTS. The population consists largely of Europeans, including principally English, Irish, Scotch, and Germans. The larger membership is in the Anglican Church. Other denominations well represented include the Roman Catholics, Presbyterians, Methodists, and Lutherans. About 20,000 of the inhabitants are Pagans and Mohammedans. Brisbane, on the southeastern coast, is the capital and largest city. It is located near the Darling Downs, hence has a large trade in grain and live stock. Other cities include Maryborough, Rockhampton, Marlborough, Gympie, Charters Towers, Ipswich, and Townsville. Population, 1901, 503,266. In 1906 the State had a population of 535,113; in 1921, 757,634.

HISTORY. Queensland was first settled in 1825, when a penal station was established near

the present city of Brisbane. It had been explored by Captain Cook as early as 1770, when he made a chart of the coast from Moreton Bay to Torres Strait, but settlements were not attempted until the government sent convicts from England. After that free immigrants began to come in, but the larger part of the inhabitants continued to be constituted of criminals. In 1839 the transportation of convicts was discontinued and the country was opened to settlers in 1842. The settlers who came before that time were known as *squatters*.

Queensland was organized as a part of New South Wales and continued to be governed in that way until 1859, when it became a separate colony. Gold was discovered in 1867 and shortly after many coolies were imported to work in the mines and on the sugar plantations. This caused an extended conflict between the labor party and the larger employers, with the result that public affairs were largely influenced by organized labor. This was the means of greatly extending government ownership to many of the public utilities, such as the telegraph, telephone, railways, and public service insurance. The colony became an important member in the Australian federation in 1899, when it ratified the constitution of the Commonwealth.

QUEENSTON HEIGHTS, Battle of, an engagement of the War of 1812, which took place at Queenston Heights, in Ontario, near Niagara Falls, on Oct. 13, 1812. The British and Canadian troops under General Brock were encamped on an eminence overlooking the Niagara River, while General Van Rensselaer and 700 Americans were stationed at Lewiston, opposite the village of Queenstown. The latter had been promised reënforcements and was charged with the duty of invading Canada. On the morning of October 13th the Americans crossed the river and made an attack, but their movements were detected by the British, who were compelled to fall back toward the village of Queenstown. Although the Americans at first were successful, the expedition proved a failure, since Van Rensselaer was not supported by the other American commanders, who plead that they were not to leave the soil of their own country. The Americans lost 190 killed and 900 prisoners, while the British lost a total of 130. General Brock was slain in action. A fine monument was erected to his memory upon the battle ground by the Province of Ontario. See **Niagara Falls**.

QUEENSTOWN, a seaport of Ireland, on the southern coast of Great Island, nine miles southeast of Cork. It is nicely located on an eminence rising from the harbor of Cork, and its streets present a picturesque appearance as they rise above each other. Strong fortifications are maintained on Spike Island and at the entrance of its well-sheltered harbor. The city has a fine Roman Catholic cathedral and sev-

eral benevolent and educational institutions, and is an important station for emigration. It has no manufactures of importance and but little trade, since the mail business is transacted chiefly at Cork. The delightful climate and beautiful scenery attract many visitors to Queenstown. Formerly its name was Cove of Cork, but in 1849 it was given its present name. Population, 1917, 8,046.

QUELPAERT (kwělpärt), or **Tamra**, an island off the southern coast of Corea, about sixty miles from the mainland. The shores and surface are more or less rocky, but tracts of considerable extent have great fertility. The island is 20 miles long and 20 miles wide, and the area is about 780 square miles. Three extinct volcanoes are on the island, each of which has a lake in its crater. The chief products are rice, fruits, fish, cattle, and silk textiles. Chyei Chyu is the chief town and capital. For the purpose of government it belongs to Corea, and has been under the jurisdiction of Japan since the Russo-Japanese War. Population, 1917, 80,260.

QUERÉTARO (kâ-râ'tä-rô), a city of Mexico, capital of a state of the same name, 110 miles northwest of the city of Mexico. It is situated on a plateau 6,370 feet above sea level, has good railroad facilities, and is surrounded by a fertile region. The city has extensive manufactures that produce cotton and woolen goods. These enterprises employ about 4,500 persons. Among the other manufactures are leather, machinery, clothing, tobacco and cigars, earthenware, and utensils. The city is well built and its streets intersect each other at right angles. It derives its water supply from an aqueduct about ten miles long, which is supported a part of the distance upon arches ninety feet high. Among the principal buildings are several fine churches, a number of educational institutions, and the government buildings. Emperor Maximilian was besieged at Querétaro by the republican forces and was shot here on June 19, 1867, by order of a court-martial. Population, 1920, 35,011.

QUERN (kwěrn), a hand mill for grinding grain, used before the invention of water or windmills. It consisted of two circular stones, the upper of which was pierced in the center with a narrow funnel and the lower was slightly dished. A wooden or metal pin was inserted in the lower stone, on which revolved the upper when turned by means of a stick thrust into a notch in the edge. The grain was dropped with one hand into the central opening as the upper stone was turned with the other. Devices for grinding grain in this manner are of great antiquity, as is evidenced by remains of querns dug up wherever regions were populated by Asiatic or European people. In some sections of Ireland, in the Shetlands, and in the Hebrides querns are still used to a limited extent. Specimens of querns now in the museums

of Rome and other European cities give evidence that they were employed very extensively in the Roman period. Those dating from that time contain ornamentations of various Roman devices.

QUESADA (kâ-sä'thâ), **Ximenes de**. See **Ximenes de Quesada**.

QUETZAL (këts'al), or **Quesal**, the name of a bird native to Central America, belonging to the trogon family. In size it resembles the magpie, but the tail coverts of the male are greatly elongated, usually from twenty to thirty inches. It clings to the limbs of trees similar to the woodpecker, since its feet are not well adapted to walking. The male is richly colored and has fine plumes on the wings, while the female is less attractive. This bird has been adopted as the national symbol of Guatemala. Its plumes and feathers are used extensively for millinery trimmings.

QUETZALCOATL (këts-äl-kô-ät'l), the mythical hero and king of the Aztecs, who was worshiped as the god of commerce and the industries. It is supposed that he resided in the ancient city of Tula, or Tollan, about forty miles north of the present City of Mexico, and extended the influence of the Toltecs, so named from their chief city, over a large tract of country through peaceful means. According to some writers he predicted the conquest of Mexico by the Spaniards.

QUEZALTENANGO (kâ-säl-tâ-nän'gô), a city of Guatemala, Central America, capital of a province of the same name, 68 miles northwest of Guatemala. It is situated on an elevated tableland and has a fine cathedral and several government buildings. Among the manufactures are cotton and woolen goods. Alvarado founded the city in 1524. Population, 1918, 24,537.

QUICHUA (kê-chôo'à), the name of one of the four divisions into which the ancient Peruvians were divided, the others being the Changos, the Atacamas, and the Aymares (Incas). Each of these families spoke a distinct language, but those of the Quichuas and the Incas were quite similar, hence some writers regard them as dialects of a common tongue. The Quichuas became subject to the Incas and constituted the more powerful class in their empire, occupying Cusco, the capital, and a vast extent of the surrounding country. At present their descendants constitute about three-fourths of the Indian population of Peru and Bolivia, where their language is still spoken by a large number. These people are small in stature, but have broad chests and are capable of enduring long and severe exertion. The skin is olive-brown or bronze, instead of being coppery like the Indians of North America. Previous to the conquest they had made considerable progress in science. They observed the solstices and equinoxes, had a decimal system of numeration, and cultivated music and poetry.

QUICK, Robert Herbert, educator, born in London, England, in 1831; died in 1891. He studied at Cambridge University, where he graduated in 1854, and was ordained as a minister of the Anglican Church. After assisting in ministerial work at Cranley and Harrow, he became lecturer on the history of education at Cambridge. Besides contributing to periodicals and works of reference, he edited Locke's "Some Thoughts Concerning Education" and published "Essays on Educational Reformers."

QUICKSANDS (kwik'sändz), the masses of loose and moving sand found at the mouths of rivers and on many seacoasts. They are formed on flat shores over beds of stiff clay through which water cannot penetrate, thus constituting a loose mixture of sand and water. Quicksands frequently occur in the vicinity of curves in narrow channels. In the latter case sand is carried by strong tidal currents to a favorable locality, where it is kept in a loose condition by moving water. Though not commonly of great extent, quicksands are dangerous to vessels or to persons, since they form an obstruction to passage and are so permeated with water that they are incapable of supporting the weight of a person. Quicksand is a term applied frequently to strata of loose sand, which in many regions carry large veins of water.

QUILLER-COUCH (kwil'lër-köoch'), **Arthur Thomas**, author, born in Cornwall, England, Nov. 21, 1863. He studied at Clifton College and Trinity College, Oxford, where he graduated with high honors. After taking his degree, he was classical lecturer at Oxford for two years, when he removed to London to engage in literary work. While there he was on the staff of *The Speaker* and contributed to other periodicals. His writings portray a vivid imagination, mastery of style, and critical study of the subjects treated. Many of his writings were published under the pseudonym *Q*. Among his books are "The Blue Pavilions," "A Procession of English Lyrics from Surrey to Shirley," "The Dead Man's Rock," "The Ship of Stars," and "The Adventures of Harry Revel."

QUILLOTA (kël-yō'tà), a city of Chile, on the Aconcagua River, 23 miles northeast of Valparaiso. It is one of the oldest cities of Chile and has railroad facilities. The surrounding country is rich in minerals, especially copper. It has a number of educational buildings, several churches, and a considerable trade. The city suffered severely from earthquakes in 1822 and 1851. Population, 1917, 13,382.

QUIN, James, noted actor, born in London, England, Feb. 24, 1693; died in Bath, Jan. 21, 1766. He was of Irish descent and made his first appearance on the stage at Dublin in 1714, but soon after engaged at the London Drury Lane theater. His eminence rests largely on his ability as a tragic actor, but he was likewise efficient in characters of a comic and

sarcastic nature. In 1717 he engaged at Lincoln's Inn Fields, where he played the part of principal actor for seventeen years, and in 1734 returned to Drury Lane theater. Quin remained the most eminent actor in Great Britain until the appearance of Garrick, in 1741, and ten years later withdrew from the stage to his permanent residence at Bath. Among the plays in which he took a prominent part are "Tamerlane," "Beggar's Opera," and as *Falstaff* in the "Merry Wives of Windsor." It is thought that he has never been excelled in the rôle of *Falstaff*.

QUINCE, a tree of the apple family. It is native to the western part of Asia, but has been naturalized in many regions and is cultivated extensively for its fruit. The tree seldom ex-



PORTUGUESE QUINCE.

JAPAN QUINCE.

ceeds a height of twenty feet. It has oval leaves, irregular branches, and white or pale red flowers. The fruit grows singly on young branches and has a yellow or orange color. When plucked from the tree it is hard and too austere to be eaten, but is valuable for boiling in sugar or to be made into preserves or jelly. A kind of preserve made from quinces is called *marmalade*. Quinces are used in making a beverage similar to cider. The seeds are demulcent and mucilaginous and are used to some extent in medicine. The *Japan quince* is a small tree, about six feet high, and is cultivated chiefly for its early and large, profuse flowers. The Greeks and Romans cultivated the quince extensively. At present it is grown in many sections of America and Europe.

QUINCKE, Georg Hermann, physicist, born at Frankfort-on-the-Oder, Germany, Nov. 19, 1834. He graduated at the University of Berlin, where he was granted the degree of doctor of philosophy in 1859, and subsequently studied at Heidelberg and Königsberg. In 1859 he became teacher at the University of Würzburg and later at Heidelberg. Besides giving

studious attention to the investigation of capillary phenomena, he did much to extend knowledge of the laws governing the reflection of light from metallic and other surfaces. He conducted experimental work in studying electrical forces and contributing to the field of science, especially physics and chemistry. He contributed many articles to Wiedemann's *Annals of Chemistry and Physics*.

QUINCY (kwīn'zī), the sixth city of Illinois, county seat of Adams County, on the Mississippi River, 260 miles southwest of Chicago. It is on the Chicago, Burlington and Quincy, the Wabash, and the Quincy, Omaha and Kansas City railroads, has a fine site on bluffs overlooking the river, and is the center of a large commercial and manufacturing trade. The streets are substantially paved and lighted by gas and electricity. A street railway system penetrates all parts of the city and has lines to many interurban points. The noteworthy buildings include the county courthouse, the public library, the high school, the State Soldiers' and Sailors' Home, the Saint Mary's Institute and the Chaddock College (Methodist). It is the seat of the Saint Francis Solanus College. Other features include the Federal building, a conservatory of music, and Washington and Riverside parks. It has many fine churches. Among the manufactures are carriages and wagons, paper, furniture, musical instruments, tobacco products, packed meat, engines, hardware, and machinery. The place was platted in 1822 and was incorporated as a city in 1839. Population, 1900, 36,252; in 1920, 35,978.

QUINCY, a seaport of Massachusetts, in Norfolk County, seven miles southeast of Boston. It is on the New York, New Haven and Hartford Railroad, has a fine harbor on Quincy Bay, and is located between the Fore and the Neponset rivers. The area is about 21 square miles. In the vicinity are extensive granite quarries, which were connected in 1826 with the first steam railway built in the United States. The city has manufactures of earthenware, boots and shoes, utensils, cigars, quarry products, and clothing. It has Adams Academy, a public library, and a home for infirm sailors. Other features include the Thomas Crane Library, the Wood Institute, and the city hospital. Quincy was the birthplace of John Hancock, John Adams, and John Quincy Adams, and the tomb of the two Presidents Adams is beneath the portico of the Adams Temple, a church erected in 1828. The first settlement in the vicinity of Quincy was made in 1625 and the town was a part of Braintree until 1792, when it was detached and named after John Quincy. Population, 1920, 47,611.

QUINCY, Josiah, eminent lawyer, born in Boston, Mass., Feb. 23, 1744; died April 20, 1775. He graduated from Harvard University

in 1763, took a law course, and attained to high rank as a lawyer. He denounced the stamp act and other measures imposed by Parliament upon the colonists in a series of articles in the *Boston Gazette*, which he signed *Hyperion*. In 1770 he and John Adams defended Captain Prescott and the British soldiers implicated in the Boston massacre, on March 5, 1770, though neither of these men was in accord with the policy of the government. He published an able work in 1774, entitled "Observation on the Boston Port Bill," and in the same year went to England as a confidential agent of the colonists with the view of strengthening the American cause. His death occurred while on the return journey to America, off Gloucester, Mass. Quincy was eminent because of his ability as a lawyer and gift of oratory. His health was delicate from early youth.

QUINCY, Josiah, author and statesman, son of the former, born in Boston, Mass., Feb. 4, 1772; died there July 1, 1864. He graduated



JOSIAH QUINCY.

from Harvard University in 1790, took a law course, and became identified as a leading member of the Federal party. After serving in the Massachusetts Legislature, he was elected to Congress in 1804, where he was distinguished as an orator and opponent of the policy of Jefferson and Madison. Among his most noted speeches

are those against slavery and in opposition to the Embargo Act and the Louisiana Purchase. He declared the latter as sufficient cause for the dissolution of the Union. He remained a member of Congress until 1813, when he declined a reelection because of the overwhelming success of the Democratic party and the War of 1812, and devoted his attention principally to agriculture. However, he entered the senate of Massachusetts a few years later, was mayor of Boston from 1823 to 1828, and served as president of Harvard University from 1829 to 1845. While officiating in that capacity he introduced marking regulations and installed a large telescope. Among his principal writings are "History of Harvard University," "History of the Town and City of Boston," "Essays on the Soiling of Cattle," and "Life of John Quincy Adams."

QUININE (kwī'nīn), the most important alkaloid obtained from true cinchona bark, first discovered in 1811. It is extracted from the bark with diluted sulphuric acid and, to precipitate the alkaloid, a quantity of lime is added to the solution. The deposit is then collected and dried and afterward it is exhausted with boiling alcohol, which dissolves the alkaloids.

When the filtered alcohol solution is evaporated, the quinine is neutralized with sulphuric acid and the solution is concentrated until the sulphate crystallizes. Quinine is very bitter. It is almost insoluble in water, but is soluble in about its own weight of alcohol and in 22 times its weight of ether. Its salts are used extensively in medicine on account of their tonic and antipyretic qualities, especially in malarial affections of all kinds. Its extraordinary value has given rise to a considerable trade in



CINCHONA.

Fruit and Flower.

Peruvian bark, and the cinchona tree is now cultivated in many parts of America and Europe.

QUINOA (kwī-nō'ā), an annual herb native to the tropical parts of America, closely allied to and resembling the common pigweed. It attains a height of from four to six feet and yields a white seed of value as food. The plant is cultivated in Chile, Mexico, and other countries, where its seed is ground and used in making cakes, porridge, and other articles of food. The *red quinoa* is a closely allied species and yields red seeds containing medical properties used in treating bruises and sores. The quinoa plant has been naturalized in Europe, where the leaves are used as a substitute for spinach and the seeds serve as food for poultry.

QUINSY (kwīn'zŷ), an acute inflammation of the throat, chiefly of the loose tissue surrounding the tonsils, hence frequently called *tonsillitis*. It is rarely confined to the tonsils themselves, but involves the soft palate, the uvula, the pharynx, and sometimes the root of the tongue. It is more prevalent during middle life and rarely affects children or persons advanced in years. The early symptoms are chills and discomfort about the throat, which are followed by severe pain and swelling of the tonsils. In severe cases it is difficult to move the jaws and delirium sometimes accompanies high fevers, but the malady is rarely fatal. It becomes dangerous through ulceration that sometimes involves a branch of the carotid artery. A mild purgative and the use of warm water as a gargle are common remedies, but stimulant and astringent gargles are used in advanced stages.

QUINTILIAN (kwīn-tīl'ī-an), **Marcus Fabius Quintilianus**, Roman advocate and rhetorician, born at Calagurris, Spain, in 36 A. D.; died about 118 A. D. He was the son of a teacher of rhetoric, studied at Rome under Domitius Afer, and became noted as a Roman advocate. From the year 61 to 68 he resided in Spain.

but in the latter year he accompanied Galba (q. v.), the future emperor, to the Roman capital. For nearly twenty years after the accession of Galba he was noted as a teacher of rhetoric and oratory, and among his students were such eminent men as Pliny the Younger and the two grand-nephews of Domitian. Emperor Domitian conferred upon him the consular dignity, and he attained to distinction as a pleader in the courts. He retired to private life about the year 89 to devote his attention to his great work, entitled "De Institutione Oratoria," a treatise on rhetoric in twelve volumes. It was written in a period of two years, and, besides containing an elaborate treatise on rhetoric, it includes valuable criticisms and opinions of Greek and Roman writers.

QUIPU (kē'pō), an aboriginal device for recording and conveying information, formerly used in various parts of Asia, Africa, and America. It consisted of a series of colored and knotted strings tied at one end to a thicker cord, and the order, color, and knots of the strings were used like elements of a written language. The earliest instrument of this kind is said to have been invented by Emperor Suy-yin of China, and the Chinese are thought to have used quipus until this form of keeping records was superseded by the art of writing. The Incas of Peru used quipus at the time those regions were invaded by the Spaniards, both for recording intelligence and conveying commands to officers. In some instances these devices were used for preserving accounts of historic events.

QUIRINAL (kwī'rī-nāl), one of the seven hills occupied by the ancient city of Rome, located a short distance north of the Palatine. West of it is the Campus Martius, which extends to the Tiber. In the time of the ancient Romans it contained a shrine of Fortuna, the temples of Quirinus and Flora, and the great baths of Diocletian and Constantine. Pope Gregory XIII. began the building of the Quirinal Palace in 1574. This structure was a summer residence of the popes until 1870, when it became the residence of the King of Italy. It is decorated with beautiful works of art, including Overbeck's painting that commemorates the flight of Pius IX., in 1848.

QUIRINUS (kwī-rī'nūs), one of the gods in the religion of the early Romans, ranking next to Jove and Mars. He represented the god of war during the time of peace, being in some respects parallel to Mars, who was looked upon as the war god at all times. Some writers think that he was identical with Romulus, who was honored by the festival of Quirinalia, which occurred annually on the 17th of February, that is, the 13th day before the Calends of March in the Roman system. The temple of Quirinus was located on Quirinal Hill.

QUIRITES (kwī-rī'tēz), the name used by the Romans to designate the civil capacity of their citizens, while *Romani* indicated the mili-

tary and political relation. While the term was a title of honor in the nation, the Quirites were looked upon with reproach in the army, since the soldiers regarded them fit only for civilians.

QUITCLAIM (kwīt'klām), the name of a deed which conveys the right or interest of a grantor in real estate without any warranty whatever of the title or quantity. In such an instrument the grantor or seller conveys to the grantee or buyer all his right, title, interest, and estate. The formal words employed usually in such an instrument are "remise, release, and forever quitclaim."

QUITO (kē'tō), the capital and largest city of Ecuador, in the province of Pichincha, near the eastern slope of the volcano of Pichincha. It is situated about 9,350 feet above sea level and its pleasant and temperate climate makes it one of the most beautiful cities of South America. The atmosphere is almost constantly clear and bracing, resembling that of perpetual spring. Its principal streets are regularly platted and well paved, but those in the older parts of the city are narrow and neglected. It has systems of waterworks and sewerage, but the street lighting still consists of gas and kerosene lamps, while the absence of railroads and substantial highways greatly interferes with commercial enterprise. Among the important buildings are those maintained by the government, including the capitol, the president's palace, the courthouse, and the townhouse. The University of Quito is the principal educational institution, but it has numerous schools and convents, a seminary, an observatory, several hospitals and asylums, a museum, and a public library of 25,000 volumes. The cathedral is a substantial structure, being well built and finely decorated, and it has a large number of other churches and monasteries. Quito is the seat of an archbishopric and is noted as a gathering place and the home of many priests, fully 500 residing here. Among the manufactures are cotton and woolen goods, spirituous liquors, jewelry, hosiery, thread, lace, and utensils. The city was founded by the Spaniards in 1534 and suffered at various times from the effect of earthquakes, particularly in 1859, when many lives and about \$3,000,000 worth of property were destroyed. The inhabitants consist principally of descendants from Spaniards and Indians, but likewise include many pure-blooded Spaniards and Indians in the city. Population, 1916, 81,405.

QUOITS, a game in which the player strives to pitch a flattened ring of steel so as to encircle a peg or hob stuck upright in the ground. The rings measure from eight to ten inches in external diameter, the rim being one or two inches wide. Two pegs or hobs of wood or iron are set upright in the ground, usually eighteen yards apart, and the player who gets the greatest number of quoits nearest the pegs is the winner. Each player has two quoits, which are pitched alternately. If a player

itches a quoit nearer the hob than either of his adversaries, he gains one point; if both his quoits are nearer than those of his adversary, he scores two points. If a quoit leans against the peg, it counts three, but if it encircles the peg, it scores five. However, if both players encircle the peg with one or both of the quoits, only the upper one is counted. Horeshoes are used extensively in playing this game. Each side may consist of one or more players.

QUORUM (kwō'rūm), the name applied to such a number of persons of any deliberative or corporate body as is necessary for the legal transaction of business. If no specific rule as to the number required has been adopted by the body, a quorum consists of a majority of the members. It is customary for most bodies to adopt rules providing that a majority of the members shall constitute a quorum, though a greater number may be required for special purposes, and in some bodies less than a ma-

jority may be made a quorum by a rule. For instance, forty members constitute a quorum in the British House of Commons. The Constitution of the United States provides that a majority of each house of Congress shall constitute a quorum to do business, but a smaller number may adjourn from day to day, and may instruct the sergeant-at-arms to compel the attendance of absent members. It was held during the first fifty congresses of the United States that the constitutional quorum must be shown to be present by the count of votes, but in 1890 Thomas B. Reed, then speaker, ruled that he might decide a quorum to be present when enough members were visibly present, though some did not vote. This position has since been generally supported and it is now held that if a majority be present to do business, their presence is all that is required to make a quorum in either house of Congress.



R

R, the fourteenth consonant and eighteenth letter of the English alphabet, which is classed as a semivowel and a liquid. It is generally considered to have two sounds; one at the beginning of a word or syllable, or when it is preceded by a consonant, and the other at the end of a word or syllable, or when it is followed by a consonant. In the former case it is pronounced by an explosion of vocalized breath, the tongue almost touching the palate or gum near the front teeth with a tremulous motion, and in the latter it is formed by a vibration of the lower part of the tongue, near the root, against the soft palate. The former use is illustrated by such words as *tree*, *ran*, and *morose*; and the latter by the words *her*, *star*, and *beard*. The *Three R's*, a term familiarly used to designate the three elementary subjects of education, reading, writing, and arithmetic, originated with Sir William Curtis. In this relation they are often spoken of as *reading*, *'riting*, and *'rithmetic*.

RABAT (ră-băt'), a maritime city of Morocco, in the province of Fez, 135 miles southwest of the Strait of Gibraltar. It is situated near the place where the Bu-Regreg flows into the Atlantic Ocean and is defended by a wall, citadel, and batteries. It has many mosques and the tower of Beni-Hassan, a structure 180 feet high. The manufactures include silk and woolen goods, carpets, saddlery, waterproofs, and leather. It has a large trade in wool, dyestuffs, olive oil, wax, and tropical fruits, though commerce has somewhat declined on account of silt settling at the mouth of the river. Rabat was founded in the 13th century and was long a haunt of pirates. Population, 1918, 27,146.

RABBA (răb'bă), a city of Western Africa, in the native kingdom of Gando, on the Niger River, about 350 miles from its mouth. It has an extensive trade in ivory and tropical products. Among the manufactures are cotton and woolen goods. Formerly it was important as a slave market. Population, 1916, 41,040.

RABBAH, a city of the Ammonites, in the valley of the Jabbok, 25 miles northeast of the Dead Sea, known at present as Amman. David and Joab captured it after a siege (II Sam. x-xii). It was afterward occupied by Ptolemy

RABBIT

II., who renamed it Philadelphia. Among the Ammonites it was known as Ammon, but the same name was applied to several other cities, including the Ammon which was located in the mountains of Judea.

RABBI (răb'bī), a title applied to persons having judicative and other special authority among the Hebrews, corresponding in meaning to the English word *master*. The title was in common use among the Jews in the time of Christ, who was thus addressed by His disciples. It is now applied to any teacher who is not a priest, especially to learned doctors of the Jewish law. *Rabin* is the equivalent French form, meaning my master, and *rabbon* is an Aramaic form, meaning our master.

RABBIT, a genus of rodent mammals, belonging to the same family as the Hares, though they are smaller and have shorter ears and hind



GRAY RABBIT.

legs. It is thought that rabbits were found originally in the western portion of the Mediterranean basin, but they have been widely naturalized and are met with in all regions, except those that have an extremely cold climate. The color in a native state is almost uniformly brown, but under domestication it may become varied, including black, white, gray, and spotted. Like the hare, it is timid and seeks safety by rapid and continuous running, and by retreat-

ing to burrows excavated in hill slopes and sandy pastures. It is gregarious in habit and in a wild state pairs for life, though in domestication it ceases to pair. The young are brought forth in litters numbering from three to eight, and are blind and naked at birth, but the mother attends to them with marked affection in burrows. They begin to breed at six months and have several litters each year. The average life of a rabbit is from seven to eight years. They have well-developed senses, but remain concealed the greater part of the day, coming out at early twilight to roam about in search of food. Rabbits feed on grass, herbage, vegetables, and bark, often inflicting considerable damage to young plants and orchards.

Many species of rabbits are widely distributed in North America, including the *gray rabbit*, or *cottontail*. This species is particularly abundant in the Mississippi valley and Southern Canada, where it is hunted in the fall and winter for its flesh. The best time to go upon a rabbit chase is directly after a newly fallen snow, when these animals may be tracked successfully to their burrows or places of hiding. The flesh is not eaten during the summer and is best in the fall, shortly after the animals have become fat on the grain found in the fields. Rabbits were not imported into Australia and New Zealand until 1860, but they are now a common pest in many sections for the reason that the climate is exceedingly favorable to their multiplication, and because few enemies are found there to diminish their numbers. In many sections they have become harmful to vegetation, eating and destroying crops, pastures, and young trees. Domesticated rabbits have been greatly modified by the skill of breeders and now vary greatly in size and color. Albinos are very common and include a remarkable species with white hair and red eyes. Besides being valuable for food, rabbits yield skins of use in making glue and size, and the hair is well adapted for felting purposes. The fur is useful for articles of wearing apparel, or for imitating the rarer and more costly furs.

RABELAIS (rà-b'-là'), **François**, humorist and satirical writer, born in Chinon, France, about 1490; died at Paris in 1553. He was the son of a farmer and about 1519 entered the Convent of Fontenay le Comte as a member of the Order of Saint Francis. While there he devoted himself with much ardor to the study of Latin and Greek and many modern languages, including Italian, German, Spanish, Hebrew, and Arabic. In 1530 he was admitted as bachelor and shortly after began the study of medicine at Montpellier, where he secured a medical degree and received an appointment as lecturer. In 1532 he was engaged as hospital physician at Lyons, where he published several works bearing on medicine and jurisprudence. He visited Rome with the Bishop of Paris, Jean Du Bellay, whom he accompanied as traveling

physician, and, after returning to France, continued the practice of medicine at Montpellier. In 1546 he settled as physician at Metz, but received an appointment as curé of Mendon in 1551, in which capacity he passed the remainder of his life.

The treatises of Rabelais on scientific subjects have long since been forgotten, but his "Gargantua and Pantagruel" continues to be classed among the most humorous and grotesque masterpieces of the world. This work appeared in five books, but the fifth was left in manuscript. Rabelais is generally credited with a happy and blameless life, one devoted to the relief of suffering and the spread of culture. His publications place him before us as a reformer of social abuses practiced in his time, and they may be regarded as satirical criticisms of the corrupt state of society of his age. The charge of irreligion and atheism was preferred against him and his works at different times, but there seems to have been little or no ground for such inferences, since his writings were characterized by the peculiar free tone assumed generally by him and his contemporaries.

RACCOON (răk-kōon'), an American quadruped mammal of the bear family, which is found from Canada to the tropics. The head



RACCOONS.

is broad behind, the muzzle is narrow, the ears are short, and the tail is ringed and moderately long. Raccoons are somewhat larger than a large cat, but they are built more heavily, have short legs, brown furry hair, and claws well adapted for climbing trees. The body is about 22 inches long and the tail measures 12 inches. They make their homes in hollow trees and burrows in the ground during the day, but at night come out in search of food and water. The food consists of vegetable and animal matters, particularly of crabs, oysters, crawfishes, green corn, and tender shoots of plants. Their flesh is a favorite article of food, for which they are hunted in the fall and winter. The *crab-eating raccoon*, or *agouara*, is native to South America and ranges as far north as Panama. It differs from the common raccoon of North America in having a more slender

shape and shorter fur. Both species are remarkable for displaying a fondness for glittering things, a trait likewise found in magpies and jackdaws.

RACE, a competitive contest of speed, including such as running, skating, riding, driving, rowing, and sailing. Racing may be a contest between individuals, as in walking and swimming; a test of machines, as in bicycle and automobile racing; or a test of speed in animals, as in driving and running horses. Sports and exhibitions of this class are very popular in Europe and America and are prominent as distinct competitive tests, or as features in fairs and exhibitions. Within recent years many of the contests assumed the distinctive feature of extending to great distances. Running foot races are usually confined to spaces ranging from fifty to eighty yards, but more recently they have been extended to include contests that cover distances of 25 miles or more. In 1908 the most extensive racing contest in the world was undertaken, in which automobiles were registered to join in a race from New York City, to Paris, France, by way of Bering Strait and the line of the Trans-Siberian Railway. Yacht races and rowing contests have assumed international proportions, such as those held at various periods between representatives of Great Britain and the United States.

Horse racing is one of the most popular sports and has been greatly modified by careful breeding and training of several species of the horse. These contests are concerned in obtaining the highest possible speed for comparatively short distances. Horses are entered for racing contests according to the class in which their record as to speed entitles them to run, and the races are again divided into those provided for runners, trotters, or pacers. The running record takes precedence of all others, since horses excel in running rather than in pacing or trotting. A mile is usually taken as the standard and the contest is on a circle of that distance. Running records of a mile in one minute and fifty seconds are high and are considered equally good to a pacing record of 2:15 and a trotting record of 2:18. Laws against gambling at race tracks have been passed by a number of states and provinces, such as the Agnew-Hart bills that were enacted into law in New York, in 1908. These laws have had a tendency to lessen interest in horse racing somewhat in the larger cities, but they have directed attention more closely to the development of speed rather than to the former practice of bookmaking and gambling.

RACES OF THE WORLD. See **Ethnology**.

RACHEL (rā'chēl). See **Jacob**.

RACHEL (rā-shēl'), **Éliza**, tragic actress, born at Mumpf, Switzerland, March 24, 1821; died in Cannet, France, Jan. 3, 1858. She descended from Jewish parentage, but is usually

classed as a French actress. Her father's name was Jacob Félix and her true name was Élizabéth Félix, Élixa Rachel being her stage name. Both her parents traveled on foot through France as peddlers, and she joined a troupe of Italian children at Rheims to earn her living as a singer in the cafés and on the streets. Her parents settled at Paris in 1830, where she received instruction from a teacher of singing who had been impressed with her talent, and in 1832 she was received in the Conservatoire. In 1837 she made her first appearance on the stage at the Gymnase at Paris, but attracted little attention until the following year, when she excited much admiration by appearing in the classic productions of Racine and Corneille at the Théâtre Français.

Her favorite rôles included *Camille* in "Les Horaces," *Emilie* in "Cinna," *Hermione* in "Andromaque," and *Monime* in "Mithridate," but she also played successfully in the modern characters of *Judith* and *Cleopatra*. She made a tour of Europe in 1849, visiting Berlin, Saint Petersburg, Vienna, and London, and everywhere received applause and admiration. In 1855 she made a tour of the United States, but returned to Europe sorely afflicted with consumption of the lungs. Mlle. Rachel had no rival in the height of her prosperity and her immense success brought a large fortune, which she lavished in a most affectionate manner upon her whole family. It is said that she was grasping and avaricious in making contracts with managers of theaters, always dictating her own terms in the engagements, undoubtedly realizing that her services were in demand.

RACINE (rà-sēn'), a city of Wisconsin, county seat of Racine County, on Lake Michigan, at the mouth of the Root River, 62 miles north of Chicago, Ill. It is on the Chicago and Northwestern and the Chicago, Milwaukee and Saint Paul railroads. An excellent harbor is afforded on the lake, permitting the entrance of the largest vessels. The site is about forty feet above the lake and the city is regularly platted, having broad and well-improved thoroughfares. It has a large trade in lumber, grain, and merchandise. The manufactures include furniture, carriages and wagons, steam engines, lumber products, linseed oil, woolen goods, rubber clothing, machinery, malted milk, and farming implements.

Racine is well built of brick and stone. Among the noteworthy buildings are the county courthouse, the city hall, the high school, the Federal building, the public library, and many fine churches. It is the seat of the Racine Academy, the Racine College, the McMurphy Home School, the Saint Catharine's Academy, the Saint Luke's Hospital, and the Taylor Orphan Asylum. Among the public utilities are street pavements, systems of waterworks and sanitary sewerage, and electric street railways. The first settlement on its site was made in 1834.

It was incorporated as a village in 1843 and as a city in 1848. Population, 1920, 58,593.

RACINE, Jean Baptiste, dramatic poet, born at La Ferté-Milon, France, Dec. 21, 1639; died in Paris, April 22, 1699. Both his parents



JEAN BAPTISTE RACINE.

died while he was yet young and he was raised by his maternal grandmother, who sent him to the College of Beauvais at an early age. His grandfather died when he was sixteen years of age, and he was sent to Port Royal to live with other relatives, where he studied ad-

vanced branches and languages. His educational study was finished at the College d'Harcourt, where he met distinguished scholars and formed a devotion for a life of letters.

The first tragedy of Racine was acted at the Palais Royal Theater by Molière's company, in 1664, and in the following year his "Alexandre," was presented on the stage. This production placed him before the public as a rival of Corneille and he was granted a pension of 600 francs by the king for a congratulatory ode. From this time he wrote many plays showing extraordinary genius, among them his celebrated "Andromaque," a production in which Rachel appeared with much success as *Hermione*. In 1677 he married a devout lady, who became the mother of two sons and five daughters, and the later part of his life was spent principally in several public offices under the king. These included an engagement as historiographer with Boileau, in which capacity he accompanied the king in his campaign to Flanders. Racine was essentially French in his dramatic writings, which comprise the greater part of his works, but he is the author of a number of odes, hymns, and epigrams. He is held to be without a rival in the grace and tender style of his writings.

RACK. See Torture.

RADCLIFFE (răd'klif), Ann Ward, novelist, born in London, England, July 9, 1764; died there Feb. 7, 1823. She descended from a family named Ward and in 1787 married William Radcliffe, a student of law, who became editor of *The English Chronicle*. She is preëminent as a writer of novels characterized by poetic imagination and possessed remarkable power of description and romantic narration. Her best known works include "Romance of the Forest," "Mysteries of Udolpho," "The Italian," "Sicilian Romance," "Journey Through

Holland," and "Gaston of Blondeville." She received \$1,500 for the copyright of "Mysteries of Udolpho," and \$2,000 for that of "The Italian," which sums were regarded very high at that time.

RADCLIFFE COLLEGE, an institution of higher learning for women, established at Cambridge, Mass., in 1879, under the auspices of the Society for the Instruction of Women. Although it had no official connection with Harvard University, it was named Harvard Annex. In 1893 the name was changed to Radcliffe College in memory of Anne Radcliffe, who was the first woman to give a money endowment to Harvard. Only certificates were granted to students prior to 1893, but degrees are now signed by the president of Harvard University. The library has 30,500 volumes and the courses of instruction are similar to those of Harvard University. About 600 students attend the institution.

RADETSKY (rà-děts'kě), Joseph Wenceslaus, Count of, eminent soldier of Austria, born at Trebnitz, Bohemia, Nov. 2, 1766; died in Milan, Italy, Jan. 5, 1858. He descended from a noble family, entered a cavalry regiment in 1784, and served against the Turks under Joseph II. in 1788-89. It may be said that he took an eminent part in all the great battles of Austria, including the battles of Hohenlinden, Wagram, and Leipsic, and in 1814 accompanied the allied forces into Paris. In 1830 he was called to Italy to suppress the disturbances that followed the French revolution of that year, and in 1831 received full command of the Austrian army in Italy. He was made field marshal in 1836 and in 1857 retired from the service.

RADIATA (rā-dī-ā'tā), the name of the lowest of the four great divisions into which Cuvier classified the animal kingdom. It includes those forms in which the parts radiate from a central axis. These parts include both the organs of sense and those of motion. This classification went out of use in the latter part of the 19th century, when the animals included in it were divided into protozoa and coelenterata.

RADIATOR (rā'dī-ā-tēr), a hollow vessel or coil of pipe through which is passed steam, hot water, or air for warming a building or an apartment. Coils of pipe are used principally and the arrangement and appearance differ more or less. In heating by steam it is necessary to provide a boiler partially filled with water, which is connected with the radiators in the different apartments by pipes. Provisions are necessary by which all the condensed steam may return automatically to the boiler, as otherwise the radiator would soon fill with water and cease to radiate heat. Systems utilizing water are constructed in much the same way, differing only in that a continuous system of pipes articulates with a heater. These and the radiators are filled with water, which begins to circulate

under the expanding influence of the heat applied in the heater, and a constant inflow of water is provided from a supply tank located in an upper story or from a city water system. The pipes which pass through basements or parts not intended to be warmed should be protected by asbestos wrapping, thus preventing the needless radiation of heat.

RADIOMETER (rā-dī-ōm'ē-tēr), an instrument for estimating the mechanical effect of radiant energy.* It was invented by William Crookes and was first exhibited at the Royal Society, London, in 1875. The radiometer consists usually of a globe of glass from which the air has been exhausted, in which is a needle support carrying a rotating four-disk vane, colored white on one side and black on the other. When the instrument is exposed to light, revolution begins immediately, and the speed depends upon the intensity of the light. Twice the effect is produced when two candles are placed near it instead of one, and the vanes may be made to spin with great rapidity by exposure to an incandescent electric light.

RADISH (răd'ish), a fleshy plant grown extensively as a garden vegetable. It is thought to be native to India, where it was cultivated in



GERMAN DWARF RADISHES.

ancient times, and was brought from that country to Europe and America. The radish is planted for its root, which is eaten as a salad or relish when young. Gardeners usually sow the seed at various times in the same year, thus insuring young and tender plants at different periods, the older insipid and woody growths being inedible. Many species have been originated by cultivation, but all may be classed under two divisions, the *long-rooted* and the *turnip-rooted*. The root of the former resembles a carrot in form and the latter has the shape of a turnip, but the size and color vary greatly in the different species.

RADIUM (rā'dī-ŭm), a radio-active metal discovered in 1898 by Professor Currie and his wife, Madame Currie, of France. It is obtained from pitchblende, a mineral consisting largely of oxides of uranium, but is difficult to procure in a pure state. It continually emits radiations of light and heat without combustion or an apparent loss of bulk or energy, but changes rapidly by oxidation. All of its properties are learned through its compounds, which are very similar to those of barium in color

and solubility. By its radio-activity it affects photographic plates through various opaque substances, discharges electrified bodies, and causes remarkable changes in living matter. The activity of this metal is measured by delicate electrical devices, which are far more sensitive than the spectroscope. Radium salts emit both heat and light and this property increases with the purity. The rays of radium reduce silver salts, transform white into red phosphorus, color glass and paper, and cause a sensation of light when brought near the closed eyes. Substances placed near radium salts become radio-active. The rays of radium cause serious burns when placed near the skin, not at once, but after a considerable time, which are difficult to heal.

Radium is employed in medicine for therapeutic purposes and to some extent for diagnostic uses. The best results have been obtained up to the present time in applications to such diseases as tuberculosis and in treating epithelial cancer. Chloride of barium is used to dilute the sulphide of radium, and in this form it is placed in a small rubber bag or disc, which is fastened upon the affected part for whatever time the physician thinks it is necessary to produce the desired results. Another method is to place the salt of radium in a small cylinder, the open end of which is held near or directly against the affected part. Since radium is exceedingly expensive and no two samples are of the same strength, it is employed with difficulty in the medical practice.

RADOM, a city of Poland, capital of a government of the same name, about 50 miles south of Warsaw. It is in a fertile section, on the Ivangorod railway, and has a large manufacturing trade. The Austro-Germans captured it in 1915. Population, 1914, 51,378.

RAE (rā), John, Arctic explorer, born in the Orkney Islands, off Scotland, in 1813; died in London, England, July 21, 1893. In 1846 he made a journey to Repulse Bay and joined the expedition under Sir John Richardson that went in search of Franklin in 1848. Five years later he proved by an accurate survey that King William's Land is an island and discovered many relics of Franklin's party. The British government awarded him \$50,000 for these services. Rae published interesting reports on the Esquimos and his Arctic expeditions.

RAFF (răf), Joseph Joachim, musical composer, born near Zurich, Switzerland, May 27, 1822; died June 25, 1882. He was born of German parents, studied at Schwyz, and formed the acquaintance of Mendelssohn and Liszt, who inspired the young musician by warm commendations. In 1850 he settled at Weimar to secure inspiration from Liszt, and there wrote many of his best known works. He married Doris Gemast, a reputable actress, in 1859, and in 1877 became director of the Conservatoire at Frankfort, a position he held until his death.

Raff belonged to the Wagner school of musicians. He displayed remarkable fertility of invention and all his works portray high artistic skill. Among the best known are "Dame Kobold," a comic opera; "King Alfred," a historic opera; and "Lenore" and "Im Wald," two symphonies.

RAFFAELLI (rà-fà-lè'), **Jean François**, painter and sculptor, born in Paris, France, in 1850. He studied art in his native city and made his first exhibit in 1870. As a painter he produced much, especially landscapes and country scenes. His sculptures consist chiefly of portrait bas-reliefs. He was awarded a medal at the Universal Exposition in 1889. His paintings embrace works entitled "Young Girl with the Cornflower," "White Horse," "At Gonon's Foundry," "Old Ragpicker," and a series of views of Notre Dame.

RAFFIA (răf'fî-à), the name of a fiber obtained from the Jupati palm, used extensively in making matting and cordage. This tree is native to South America, where the natives gather the fiber and use it in making clothing. Large quantities of raffia are exported to the manufacturing centers of Europe and North America. Raffia weaving is a branch of kindergarten work in many schools of Canada and the United States.

RAFFLESIA (răf-flē'shî-à), a genus of plants native to the East Indies and the Philippines. Ten species have been described, all of which are parasitic. They are nearly rootless, stemless, and leafless, and consist almost entirely of flowers, which rise in the form of the heads of cabbage. One species bears a flower three feet in diameter, weighing about fifteen pounds, and this is the largest bloom in the world. It was discovered in 1815 by Sir Thomas Stamford Raffles, a British officer in Sumatra, from whom the genus was named.

RAGLAN (răg'lān), **Fitzroy James Henry Somerset, Lord**, field marshal, born Sept. 30, 1788; died June 28, 1855. He was the youngest son of the fifth Duke of Beaufort, entered the army in 1804, and served on the staff of the Duke of Wellington in the Peninsular War. Wellington engaged him as secretary for the latter part of that war, and he distinguished himself in the capture of Badajoz. He lost his right arm in the Battle of Waterloo, but immediately began practicing writing with his left hand. In 1816 he was made secretary to the embassy at Paris and from 1819 to 1852 was military secretary to the Duke of Wellington. He attended the congress of Verona in 1822 in company with the duke, and after 1852 served as master general of ordnance. The House of Lords created him Baron of Raglan in 1852, but he had previously been a member of the House of Commons for Truro, from 1818 to 1826. He was made commander of the English forces at the beginning of the Crimean War, in 1854, becoming field marshal for services in the

Battle of Inkerman. His death resulted shortly after from dysentery.

RAGNARÖK (răg'nâ-rēk), the name applied in Scandinavian mythology to the time when the world is to be dissolved, when the gods will come into mortal conflict with the spirits of evil. They thought that depravity and strife will herald the approach of this great event, when piercing winds will prevent the coming of summer. Then the ferocious wolf will be freed from its chains and the Midgard serpent will gain land, while the heavens will be rent in twain and the earth will become denuded of its vegetation. Odin, Vidar, and Thor are to be destroyed, and the earth is to be wrapped in fire and sunk beneath the sea. After Ragnarök has passed away, a new earth and a new heaven are to take the place of the old. It is to be the golden age of good and happiness, when the triumphant gods shall establish peace and good will among men forever.

RAGSTONE, a rough, impure limestone rock, which breaks into raglike fragments. It is well adapted for whetstones used in sharpening steel instruments. The name is generally applied to hard, irregular rock overlying better grades of building materials, but which is used for building purposes.

RAG TRADE, the traffic in fragments of textile materials. Formerly these commodities were regarded valueless, but now they form important materials in manufacturing enterprises. Rags are collected at present with considerable care in all countries, but for centuries they were allowed to waste or were used to a very limited extent in stuffing saddlery. They are gathered in large quantities in Canada and the United States by persons traveling from house to house, but the demand for them is greater than the supply, hence considerable quantities are imported. Linen and cotton rags are consumed almost exclusively in the manufacture of paper. Bank notes, ledgers, and papers of light quality are made mostly of rags, but printing paper is made largely by mixing wood pulp with rags. Rags of woolen or worsted goods are not used in paper making, but are carefully sorted, the inferior portion being used for manure, while all the available loose texture is unraveled by machinery and, after mixing with good wool, is made into goods generally known as *shoddy*. The refuse matter remaining after carefully selecting the different grades is pulverized and used in making flock papers. In London and many other European cities companies are maintained to collect rags by utilizing the labor of children. This plan is employed in the larger cities of America, while in the country districts venders of trinkets and merchandise collect rags and fragments of metals, usually paying for them with tinware or small articles, such as handkerchiefs.

RAGUSA (rà-gōō'zà), a maritime town of Europe, in the southern part of Dalmatia, about

forty miles northwest of Cattaro. It was formerly an independent republic, but now possesses little of its former prosperity. The place is surrounded by a wall and has a number of machine shops and mills. Among the manufactures are clothing, oil, silk, leather, tobacco, soap, and utensils. It has a considerable export trade. Ragusa was founded about 656 by refugees from a city of the same name in Sicily, and in the time of the Byzantine Empire had a flourishing trade and important educational and manufacturing institutions. It became subject to Venice in the 12th century, but formed an independent republic at the beginning of the 15th century, which was finally overthrown by Napoleon in 1808. Both the town and the province became a part of Austria in 1814. Population, 1916, 13,447.

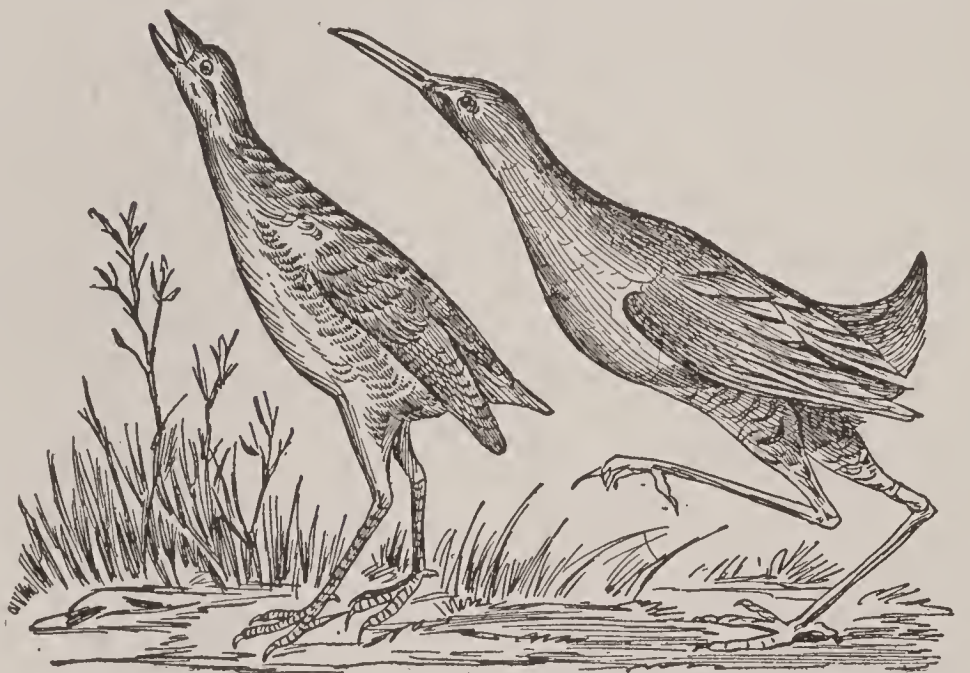
RAGUSA, an ancient city of Sicily, thirty miles southwest of Syracuse, fifteen miles from the Mediterranean. It is situated on the Ragusa River and occupies a site in the midst of a productive agricultural and stock-raising region. Among the manufactures are cotton textiles, woolen and silk goods, oil, wine, and utensils. In its vicinity are a number of ancient tombs and the city is surrounded by a substantial wall. Population, 1916, 32,422.

RAGWEED the name of an annual plant found in the Temperate Zone of Europe and North America. It is so named from the ragged appearance of its leaves. Some species are locally called *hogweed*, since they are eaten by swine. The flowers appear in clusters, usually golden-yellow in color. This plant thrives in rich, damp soil, and is usually found in pastures and along the highways.

RAHWAY (rə'wā), a city of New Jersey, in Union County, on the Rahway River, sixteen miles southwest of New York City. It is on the Pennsylvania Railroad and is the home of many New York business men. Among the features are the public library, the high school, the Y. M. C. A. building, and several parks. The manufactures include carriages, clothing, woolen goods, utensils, and machinery. Gas and electric lighting, sanitary sewerage, waterworks, and rapid transit are among the improvements. Population, 1905, 8,649; in 1920, 7,042.

RAIKES (rāks), **Robert**, the founder of Sunday schools, born in Gloucester, England, Sept. 14, 1735; died April 5, 1811. He succeeded his father as proprietor of the *Gloucester Journal* in 1757 and managed that periodical until 1802. In 1780 he originated the system of Sunday schools by gathering a number of children from the streets for religious training. The last thirty years of his life were devoted largely to promoting schools of this kind, and he lived to witness the extension of the Sunday school system throughout England.

RAIL, the name applied to many birds of the subfamily *Rallinae*, most of which are related to the coots and gallinules. These birds are widely distributed and include upward of 150 species. Among the familiar birds of this class are the rails proper, the water hens, the coots, and the crakes. The *water rail* of Europe and the *Virginia rail* of North America are quite similar and form representative types. They have a long bill, long and powerful legs, an olive-brown or a bluish-ash color, and are about eleven inches in length. These species are highly esteemed for their flesh. The Virginia rail is a bird of passage. It feeds on worms, mollusks, and soft vegetable substances, and is abundant in many parts of North America. It is very shy in its habits and, when detecting danger, escapes by passing swiftly through the reeds rather than by flight. The *fresh-water marsh hen* is about twenty inches in length



CAROLINA RAIL.

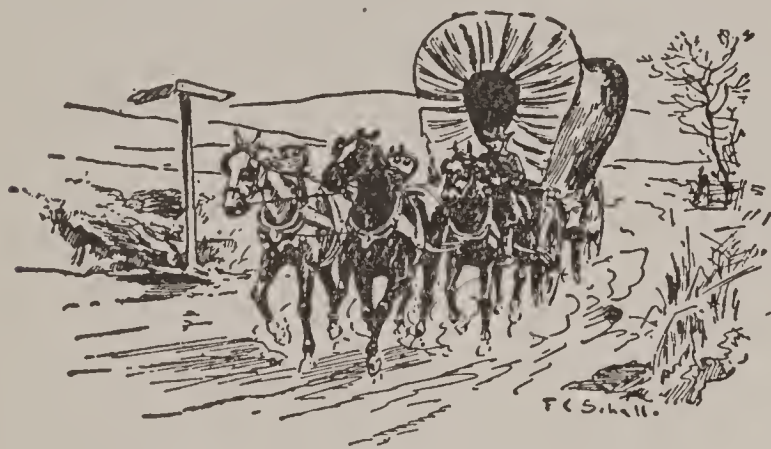
VIRGINIA RAIL.

and is abundant in the marshes of the Southern States. Its body is eighteen inches long, the bill has a length of three inches, and the weight is nearly two pounds. The *mangrove hen* is native to the West Indies, where it is found along the muddy shores and in marshes. The *land rail* is commonly known as *corn crake* and is about half the size of a partridge, but appears quite as large as that bird.

RAILROADS, or **Railways**, the graded roads having one or more tracks of metal rails supported by ties or sleepers, designed for the passage of rolling stock. It may be said that railroads are exclusively modern institutions, though similar improvements were utilized in a primitive way by the ancients. The Romans constructed grades and built tracks of two lines of dressed stones, connected end to end, so as to form hard, continuous surfaces for the passage of vehicles drawn by horses. Similar tracks constructed of two parallel lines of wooden beams, having flanges to prevent the wheels of the cars from leaving the track, were built in many parts of Europe early in the historic

period. However, these were built principally within mines for transporting material to the place of exit, or for the purpose of conveying the mineral products to the places of use or shipment. Tramways were in general use in connection with the mines of Europe in 1662, and about that time they began to be used for conveying freight. The rails consisted of timber and in 1676 additional wearing rails were provided to replace those worn out, and later flat strips of iron were nailed on the surface to add greater durability.

HISTORY OF RAILROADS. Cast-iron rails were first used in 1767. They were made in lengths of five feet and a cast-iron flange was soon after added to serve in keeping the wheels on



PRIMITIVE MODE OF TRAVELING.

the track. Nicholas Cugnot, a Frenchman, was the first to invent a steam engine of practical service in moving cars on a railway track. His engine was completed in 1769 and is preserved as a remarkable curiosity in Paris, and a full-sized model of it may be seen at the Chicago Field Columbian Museum. It has a pair of single-acting thirteen-inch steam cylinders, by which power is communicated to a single drive wheel, and was designed for transporting artillery. Though important as leading to the perfection of the steam engine, it is a mere toy when compared to the vast machines of modern structure.

The invention made by Cugnot stimulated many mechanical engineers and scientists of Europe to devote marked attention to the construction of a machine that would combine the qualities necessary to move cars safely and rapidly over rails. This ambition to add materially to practical engineering soon spread to America, and Oliver Evans, of Philadelphia, obtained a patent on steam carriages in 1787. Railroad building was delayed to a large extent by the construction of canals in many sections of Europe and America, and it was argued that no form of transportation could surpass water navigation from the standpoint of safety and low freight or passenger rates. Although this view was proved to be entirely correct, railroad building still remained a favorite theme of study, since it was desired to secure greater rapidity and to establish highways of travel and commerce where water navigation could not be utilized. It may be said that Oliver Evans is the

inventor of the high-pressure double-acting steam engine, since his first product of this class was completed in 1800. However, England claims that honor for Richard Trevithick, who, about the same time, constructed an engine to draw wagons on rails. Oliver Evans (q. v.) built a steam dredge in 1804, which was the first steam-propelled vehicle made in America that moved successfully. For many years engineers entertained the mistaken notion that locomotives cannot do their work successfully without having spur wheels, and mechanical engineers conformed their engines and tracks along that view, but a coal operator of England, in 1812, successfully demonstrated that smooth wheels run more easily and successfully on smooth rails. This having been satisfactorily established, nothing more was needed than to provide a machine that would possess the desired amount of speed. In 1814 George Stephenson made a practical success in building a locomotive for railroad use. It was built with money advanced by Lord Ravensworth and ran 35 miles an hour. The first railway opened in England was that from Stockton to Darlington, in 1825, and the second was built from Liverpool to Manchester in 1830.

NORTH AMERICA. The first railroad constructed in North America was projected in 1825 and extended from Quincy, Mass., to the nearest tidewater, about four miles. It was completed the following year and was used principally for carrying granite from the quarries near Quincy. The second railroad extended from mines near Mauch Chunk, Pa., to the Lehigh River and was completed in 1827. The New York Central was projected in 1825; the Boston and Albany, in 1827; and the Baltimore and Ohio, in 1828. In 1830 only 23 miles of railroads were completed and in operation in the United States. The engines used were of the Stephenson make and were imported from



MODERN MODE OF TRAVELING.

England. Since then many vast improvements have been made in building railroad tracks and rolling stock, and lines are now operated in nearly all sections of the United States and in the southern part of Canada.

The United States has a larger railroad mileage than any other country in the world. It has witnessed a marvelous extension of rail-

road mileage since 1830, not a single year having passed without material additions being made to the value and utility of these necessary highways of modern commerce. At the beginning of the Civil War, in 1861, that country had 29,739 miles of railroads, and in 1873 it had 70,268 miles. The following table contains an exhibit of interesting matters in railroad development during the decade ending with the last report of the United States:

YEAR.	TOTAL MILE-AGE.	TOTAL CAPITAL.	TOTAL DEBTS.	NET EARNINGS.
1891..	164,686	\$4,809,176,751	\$5,233,295,074	\$356,209,880
1892..	170,499	4,920,555,225	5,463,611,204	358,638,520
1893..	173,012	5,080,032,904	5,570,293,613	364,591,109
1894..	176,919	5,075,629,070	5,665,734,249	322,539,276
1895..	179,198	5,231,373,852	5,712,052,517	327,505,716
1896..	180,891	5,200,600,725	5,690,970,314	332,333,756
1897..	184,603	5,230,924,860	5,720,828,215	338,170,195
1898..	187,340	5,240,728,254	5,727,364,201	341,244,580
1899..	190,833	5,262,286,561	5,753,123,790	356,280,760
1900..	195,133	5,276,524,380	5,800,542,870	361,080,203
1916..	260,690	10,681,493,092	9,286,584,350	604,013,895

CONSTRUCTION. The first work in railroad building is to make a survey of the projected route between two places for the purpose of ascertaining the most practicable line, and for setting grade stakes to indicate the amount of cuts and elevations to be made. It is aimed to make the line as nearly level and straight as possible, since both are important factors in facilitating speed and promoting traffic without

the wood commonly used for that purpose including white oak, yellow pine, chestnut, and hemlock. Afterward the roadbed is treated with a process called *ballasting*, which consists of imbedding the ties in a layer of sand, gravel, earth, or crushed stone. At present the rails are made almost exclusively of steel. They are spiked at a certain distance or width from each other, called the *gauge*. Three different gauges, known as *narrow*, *standard*, and *broad*, are in general use throughout the world. However, the railroads are chiefly of the standard gauge, which is four feet eight and a half inches (1.435 meters) wide, and the rails are made principally of the *T steel*, so called from its resembling the form of the T turned upside down. One pair of parallel rails constitutes a single track of railway, two pairs, a double track; and with each system are a number of *side tracks* connected with the main line by *switches*.

EQUIPMENT. The cost of building the railroad lines is only a portion of the general expense to be considered in construction and operation, since depots, freight offices, telegraph lines, and rolling stock are all important items to be added in estimating the general cost. Cars for the transportation of freight are variously constructed and include those designed particularly for way freight, grain, coal, oil, fruit, and other perishable commodities. The express and

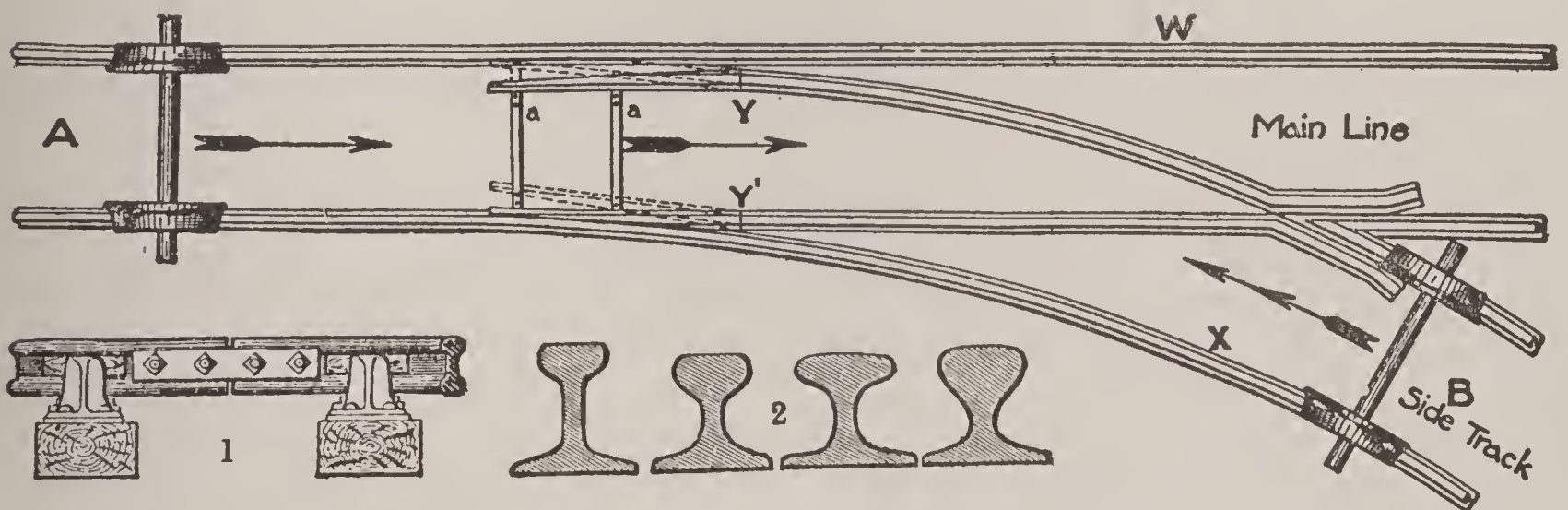


DIAGRAM TO SHOW RAILROAD AND SWITCH.

A, Wheels passing the Y of the switch on the main line; B, wheels passing from the side track to the main line; 1, connection of rails at the ends and plan of mounting upon the ties; 2, cross sections of T rails.

needless expense. To do this it is generally made an object to follow the valleys of streams wherever practicable, though in many sections it is necessary to penetrate hilly and mountainous regions. In an undulating country railroad builders aim to have the cuts supply the necessary amount of earth to build the embankments required in carrying the grade over depressions. Tunnels are cut only through the higher hills and mountains. In many regions where snowstorms, or snowslides, prevail it is necessary to protect the portions of railroad tracks passing through cuts by snow fences.

After the grading is completed, the *ties*, or *sleepers*, are placed across the grade at a distance of about twelve inches from each other,

postal business is largely in connection with passenger trains, though on some lines the express and postal service is carried on trains designed especially for those purposes. The Baltimore and Ohio Railroad issued the first time-table for passenger trains in the United States in 1830. Sleeping cars were made as early as 1837, dining cars came into use in 1867, and George M. Pullman patented the vestibule car in 1887. Passenger trains of the first class are made up of cars fitted with two six-wheel trucks. They have electric or gas lights, hot water or steam heating, automatic air brakes, and automatic couplers, and include vestibule cars for dining and sleeping. In some of the finer cars are apartments containing a barber

shop, a smoking room, a bath room, a library, etc. The block signaling system is used on all first-class lines, thus providing practical safeguards against danger.

ELECTRIC AND OTHER RAILWAYS. Much activity has been displayed in building *electric railways*, which are so named because the cars, or trains of cars, are propelled by electric power. They are now utilized not only for urban and suburban passenger traffic, but have come into a wide use in the interurban districts for the conveyance of passengers, express, mail, and freight. In many cities railway lines are built above the streets, known as *elevated railways*,

partly to overcome the dangers attending crowded streets, and to make it possible to provide greater rapidity in the transit. Sys-

tems of elevated street railways are operated in New York, Chicago, Berlin, London, Paris, Vienna, and other great cities of the world. *Underground railways*, or *subways*, are operated in New York, Paris, London, and elsewhere. *Cable railways*, which employ underground cables to propel the cars, are in use in some cities and in mountainous districts, being most serviceable in making steep ascents and descents.

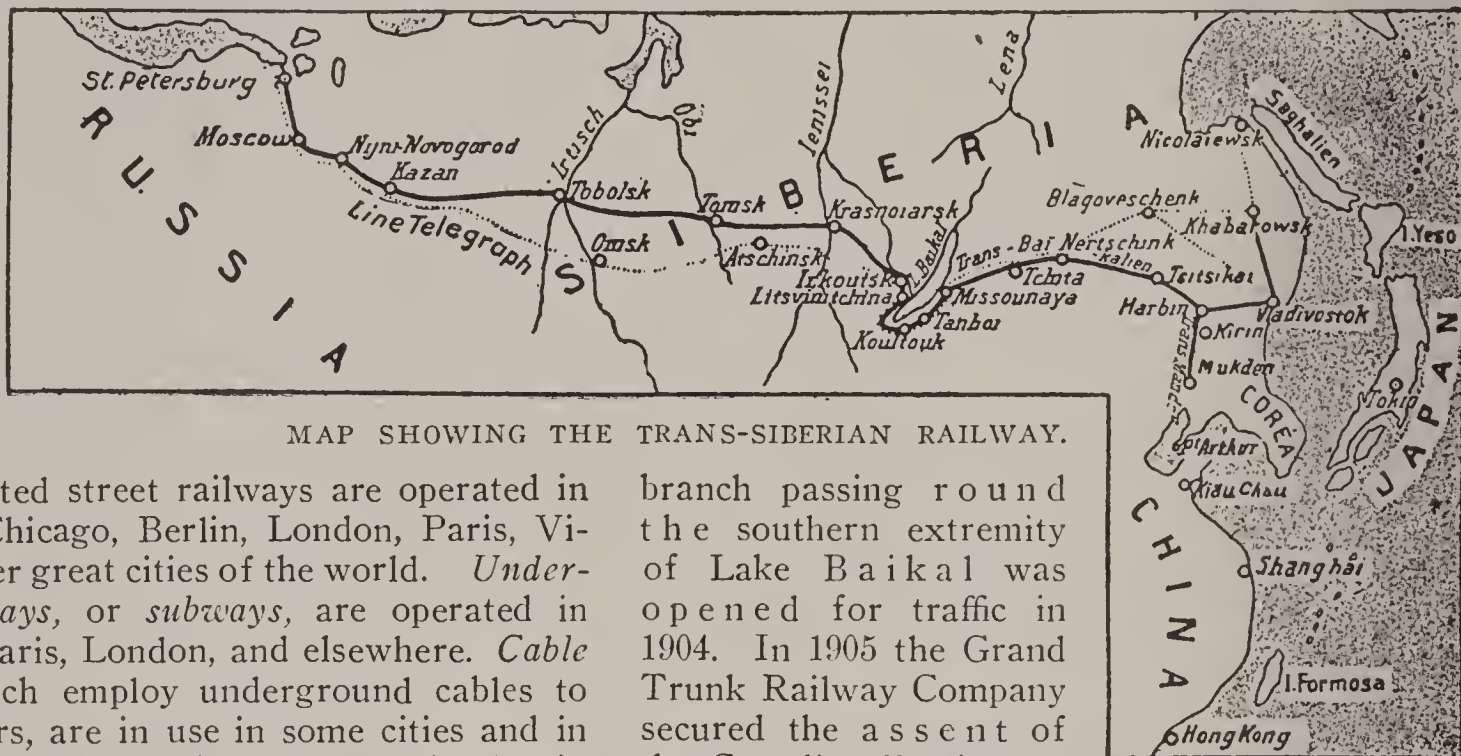
RAILROADS OF THE WORLD. The total railroad mileage of the world is placed at 737,533 miles, of which 321,525 miles are in North America. The following is the mileage of railroads in the grand divisions according to the latest accounts: North America, 311,525; Europe, 200,519; Asia, 80,722; South America, 60,820; Africa, 38,487; and Australasia, 25,460.

In some countries of Europe and Asia transportation is facilitated by canals, and the location of many commercial centers is such that they can be reached easily by navigation on streams and the ocean. This accounts in part for a smaller mileage than would seem adequate to transport interior trade when the population and industries are taken into account, but there are many regions where railroad construction would seem highly advantageous and no doubt will receive greater attention in the future. Railroad building is a material factor in the development of natural resources, especially in regions remote from the seaboard and where highways have not been improved. The countries having more than 5,000 miles of railroads at the end of 1921 are given in the list below, taken from the *New York Railroad Gazette*:

Sweden	9,242	Australia	22,825
Spain	9,447	Italy	11,881
Mexico	16,660	Argentina	21,479
Brazil	17,248	British America.....	35,379

Great Britain.....	24,164	Russia	48,130
Austria-Hungary	29,432	Germany	39,943
British India.....	35,515	United States.....	266,690
France	31,285		

Great Britain stands at the head of the list in the number of passengers carried in one year, namely 1,062,911,000. In the United States the number of passengers carried in a year is 965,300,000; in Germany, 925,600,000; and in France, 410,240,000. The Trans-Siberian Railway from Moscow to Dalny, a distance of 5,403 miles, is the longest line in the world, and from it are branches to Saint Petersburg, Port Arthur, and Vladivostok. Work on double-tracking the main line is progressing rapidly. The



MAP SHOWING THE TRANS-SIBERIAN RAILWAY.

branch passing round the southern extremity of Lake Baikal was opened for traffic in 1904. In 1905 the Grand Trunk Railway Company secured the assent of the Canadian Parliament for a new Trans-Canadian Railway, from New Brunswick in the east to the Pacific in the west, which was projected to Dawson, Yukon, in 1909. The government of France has projected a Trans-African line across the Sahara, which will likely be completed within the next decade. It is to extend from Algiers to the west shore of Lake Tchad.

RAIN, the condensed vapor of the atmosphere falling to the earth in drops large enough to obtain sensible velocity. It differs from *mist* in that the latter falls in very small drops or particles, and from fog, which is composed of particles so fine as to be not only individually indistinguishable, but to float or be suspended in the air. A large amount of watery vapor is always present in the air, but warm air is capable of holding a much larger quantity than cold air. The vapor suspended in the atmosphere is derived by evaporation of water from the surface of the earth, by far the larger part being taken up from the ocean, though there is a considerable evaporation from the land and interior bodies of water. The quantity of moisture that the atmosphere may hold depends upon the temperature, and, when it contains all that it is capable of holding, it is said to be *saturated*, or at its *dew point*.

To produce rain, it is necessary that the temperature of a large mass of air be reduced con-

siderably below its dew point. This condition may be brought about by a change of latitude, that is, a warm moisture-laden wind may blow into a cold region; or by a change of altitude resulting from an ascending current of air carrying the moisture of the lower strata into the upper regions. It is mainly in the latter manner that the rains of the tropical regions are caused, but the effect is similar in mountainous districts when a moist wind reaches a mountain range and is forced to ascend the slopes. Rain is also caused by the mingling of masses of cold and warm clouds, though the precipitation from this cause is never considerable, since the colder air becomes warmed by the mixing, and thus acquires greater capacity for holding moisture.

As raindrops fall through the cloud they become larger by other drops uniting with them, hence their size depends upon the density of the cloud. Generally they are larger in the daytime than at night and are larger in the tropics than in the polar regions. The air is purified by rain falling through it, and by the mixture of the upper and lower strata of air resulting from its passage through the strata. Rain has a wholesome effect upon the earth, since offensive gases are washed from the surface by water flowing over it or passing into the soil. Fresh rain water contains a small quantity of ammonia and carbonic acid, on account of which it has a more wholesome effect upon plants than that derived from wells and springs. A great variety of circumstances affect the quantity of rainfall in different localities, such as nearness to the sea, exposure to prevailing winds, latitude, altitude, and the presence of mountain ranges. Rainfall is affected by the presence of vegetation, since an abundance of vegetable forms tends to aid condensation by keeping the soil cool, while a desert region becomes highly heated and directly counteracts condensation. More rain falls in the tropics than in the temperate regions, and more descends in the temperate than in the polar regions. This is due to a decrease in the quantity of heat and evaporation with moderate regularity from the Equator toward the poles.

The distribution of rain determines in a large measure the material industries of the people, since without moisture any region is a mere desert and the subsistence of animal and vegetable life is either entirely impossible or greatly limited. The supply of rain in the vast interior of North America depends upon the winds blowing from the Gulf of Mexico. These winds are influenced in a measure by the elevated ranges of the Sierra Madre Mountains, in Central America and Mexico, and thus are directed to spread themselves over the great basin of the Mississippi River. The movement of these winds may be traced from the equatorial regions to the vicinity of the peninsula of Yucatan, and as they proceed toward the north and west

they appear to be elevated by a countercurrent of colder winds near the surface. In moving from the lower to the higher latitudes they gradually give off their store of moisture. The quantity required in the upper part of the valley is perceptibly less than in the southern part, since the temperature is noticeably lower; thus the valley is adequately watered from the Gulf of Mexico to the regions extending far into Canada.

The Atlantic coast plain and the western slope of the Pacific derive an abundance of moisture from the respective oceans, but there is a considerable shortage of rainfall in the Pacific highlands and the slopes of the Rocky Mountains. Among the vast arid regions are the Sahara and Kalahari deserts of Africa; the Arabian, Tarim, and Gobi deserts of Asia; the coast of Peru; and the great interior of Australia. On the other hand, there are regions where rain falls almost daily or periodically with great excess, such as Patagonia, the lake regions of Africa, parts of India, and the northern part of Brazil. The quantity of rain which falls in a given time on any area is determined by means of an instrument called the *rain gauge*. The following statistics show the average rainfall of various places of interest: Cherapungee, India, 610 inches; San Luis de Maranhao, Brazil, 280 inches; Paramaribo, Guiana, 229 inches; Havana, Cuba, 91 inches; Sitka, Alaska, 90 inches; western Sweden, 82 inches; southern Germany, 27 inches; the British Islands, 40 inches; Washington, D. C., 38 inches; and San Francisco, Cal., 23 inches. The average rainfall in the United States in the semi-tropical zone is 39 inches and in the temperate zone, 34 inches. In Canada the rainfall is greatest on the eastern and the western coasts, with a semi-arid region on the eastern slope of the western highlands, where the precipitation ranges from 10 to 21 inches.

RAINBOW, a luminous arch appearing in the clouds opposite the sun, due to the refraction, reflection, and dispersion of light in drops of water falling through the air. The light is thus decomposed into its simple colors, which always appear in the same order; namely, violet, indigo, blue, green, yellow, orange, and red. A perfect rainbow consists of two concentric arches, the inner or brighter being called the *primary* bow, while the outer or fainter arch is called the *secondary* bow. In the primary bow red is the outer color and violet the inner, while in the secondary bow the colors are dimmer and arranged in a reverse order, this being due to a double reflection within the drops. Rainbows are seen only when the sun is 40 degrees or less above the horizon, hence they occur both in the morning and in the evening. Only a part of the rainbow is seen, since a portion of it is below the horizon, but an observer standing on the top of a high mountain can see a greater part of it than an observer occupying a lower alti-

tude. The bow is circular in form because the red ray of the primary bow forms an angle of about 42 degrees when it leaves the drop, and the violet forms one of 40 degrees. The occurrence of a broken rainbow is due to only parts of the field being filled with falling rain, or to the sun being obstructed from parts of it. Rainbows forming a complete circle are caused by the rays of the sun falling on the spray rising from a waterfall or cataract, but this phenomenon is of rare occurrence. They are formed occasionally by the light of the moon, called *lunar rainbows*, but these are not so bright as those seen in daytime.

RAIN GAUGE, or **Pluviometer**, an instrument for measuring the amount of rain which falls on any given surface. The measurement of rainfall has long been regarded important, and various contrivances to secure fairly accurate tests have been devised. The form generally used consists of a cylindrical vessel with a horizontal base, surmounted by a funnel-shaped top into which the rain enters. A glass tube with an attached scale is connected with the lower part of the cylinder. As the water enters the cylinder it rises in the glass tube and it becomes an easy matter to read the quantity of rain fallen in inches by observing the scale. It is necessary to place the rain gauge in a position free from eddies and whirls. The rain-water accumulated may be emptied by means of a stopcock at the bottom. It is quite important to locate the instrument as near the general level of the region to be tested as possible, since rainfall is more abundant near the ground than at some distance in the air. This was verified in a practical test made at Des Moines, Iowa, where it was found that the rainfall near the general level of the region for one year reached 30.2 inches, while at a height of 150 feet above the general level it was only 24.8 inches. Automatic rain gauges now made have a graduated scale for estimating the rainfall collected by the funnel. They indicate the duration of each shower as well as the rate at which the water falls. The fall of snow, in a melted condition, is always included when speaking of the rainfall of a country.

RAINY LAKE, an inland lake of North America, which forms part of the boundary between Minnesota and Ontario. It is situated 160 miles west of Lake Superior. Rainy Lake is about 40 miles long, has an average width of five miles, and is 1,160 feet above sea level. It has numerous small islands and valuable fisheries. Rainy Lake River, a stream about 100 miles in length, carries its surplus water into the Lake of the Woods.

RAISIN (rā'zīn), the dried fruit prepared from the grape and used for dessert or in cookery. The species of grapes containing a large quantity of sugar are of greatest value in making raisins. Several methods of producing raisins are in use, those of inferior quality being

dried in an oven. The best grades are made from choice grapes by cutting half through the fruit stalk without detaching it from the tree, thus leaving the cluster to shrink and dry by the heat of the sun while on the vine. Another method is to dip each bunch of grapes into a solution of lye made of the ashes of the burned tendrils, after which the fruit is dried by exposure to the sun. Large quantities of raisins are produced in California, but the principal producing countries are Spain, Asia Minor, Egypt, and other regions adjacent to the Mediterranean Sea.

RAISIN RIVER, **Battle of the**, an engagement at Frenchtown (now Monroe), Mich., in the French and Indian War. General Harrison had sent a detachment of Americans under General Winchester to take possession of Frenchtown, where he was surprised on Jan. 22, 1813, by a force of British and English under General Proctor. The Americans were defeated, but received assurances from the British that those left in the village would be protected from the Indians. After the British departed with their prisoners for Malden, the Indians massacred nearly 400 and took the balance away into captivity. After that event the Americans frequently used the cry, "Remember the Raisin River."

RAJAH (rā'jā), or **Raja**, a title borne originally only by the princess of the Hindu race, but now conferred by the British government upon Hindus of rank. Anciently the title was borne only by the military caste and powerful princes, but it is now assumed by landholders and members of inferior castes.

RAJPUTANA (rāj-pōō-tā'nū), an extensive division of British India. It is bounded on the north by the Punjab, east by Agra and Oudh, southeast by the Central India Agency, and west by Bombay. The area is 127,541 square miles. A large majority of the inhabitants are Hindus, but they are divided considerably in religious affiliations, including Brahmins, Mohammedans, Jains, and a small number of Christians. Population, 1916, 9,828,103.

RAKE, an implement with teeth or tines, which is used for collecting loose material or smoothing and evening a surface. The hand implements with parallel teeth fixed at right angles to a long handle are the simplest form of rakes. The horse rakes now used by farmers are two-wheeled implements. They are drawn by one or two horses and are provided with curved tines between the wheels for gathering hay into windrows and cocks.

RALEIGH (rā'li), the capital of North Carolina, county seat of Wake County, near the Neuse River, 147 miles northwest of Wilmington. Communication is furnished by the Southern and the Seaboard Air Line railroads. It occupies an elevated site in the upper valley of the Neuse, about 320 feet above sea level, and is surrounded by a fertile region. Near the center

of the city, in a small but well-kept square, is the State Capitol. Other noteworthy buildings include the county courthouse, the Federal post office, the State penitentiary, the State Geological Museum, the State Insane Asylum, the State College of Agriculture and Mechanic Arts, and the Governor's mansion. It has many fine libraries, including the State Library of 40,000 volumes. Pullen Park and the Confederate and National cemeteries are fine public grounds. Among the institutions of higher learning are the Saint Mary's School, the Peace Institute, the Raleigh Male Academy, the Shaw University, the Saint Augustine Collegiate Institute, and the Latta University. Raleigh is important as a market in cotton, tobacco, and general merchandise. It has manufactures of cigars and pipe tobacco, cotton-seed oil, clothing, machinery, marbleware, carriages, wagons, furniture, flour, railroad cars, and hosiery. The streets are well graded and improved with drainage and pavements. Raleigh was chosen as a site for the State Capitol in 1792 and was incorporated two years later. In 1865 the city was occupied by General Sherman. Population, 1920, 24,418.

RALEIGH, Sir Walter, navigator and statesman, born in Devonshire, England, in 1552; executed Oct. 29, 1618. He descended



SIR WALTER RALEIGH.

from an ancient English family, entered Oxford University in 1566, but in 1569 left that institution without graduating to aid the French Protestants under Coligny. Later he joined a military force sent by Queen Elizabeth to aid the patriots in the Netherlands in their

struggle against Spain, and in 1580 attained eminence by aiding to suppress a rebellion in Ireland. Raleigh was a man of handsome figure, with a tall form, lofty forehead, and dark hair, and his imposing personality made him quite a favorite at the court of Elizabeth. He formed a scheme to colonize America in 1579 and was granted a charter for that purpose, in which enterprise he was assisted by his half-brother, Sir Humphrey Gilbert. His expedition was at first apparently successful in privateering against the Spanish, but his efforts to found permanent colonies in Virginia were made unsuccessful by Spanish encroachments. A large share of the forfeited estates of Ireland was granted to him in 1584. Soon after he introduced the culture of the potato in Ireland

and was granted special trade privileges to strengthen his colonization scheme in America. He was knighted in 1585, and became captain of the queen's guard in 1587.

Raleigh, in 1588, rendered services against the Spanish armada and subsequently equipped vessels to drive the Spanish forces from strategic points. He privately married Elizabeth Throckmorton, a maid of honor of the queen, in 1593, and thereby incurred the temporary displeasure of her majesty. While banished from court, he headed an expedition to Guiana, where he hoped to discover the fabled El Dorado, a supposed region of gold and gems, for which he embarked in 1595. This expedition resulted in nothing more than taking possession of the country in the name of Elizabeth, and on returning he published an account of the journey. Elizabeth reinstated him to royal favor shortly after his return, and gave him a naval command in 1596, under the Earl of Essex and Lord Howard, who sailed to destroy the Spanish fleet and capture Cadiz. The enterprise terminated in success largely on account of efforts put forth by Raleigh. He further served the queen by capturing Fayal, in the Azores, in 1597, and became Governor of Jersey in 1600, but his brilliant career ended with the death of Elizabeth in 1603.

James I. had well-established prejudices against Raleigh and immediately deprived him of every official position. He was accused of being implicated with Lord Cobham in a treasonable plot to secure the throne for Arabella Stuart, and, after a trial at Winchester, was found guilty and sentenced to be executed. This sentence was afterward commuted to life imprisonment in the Tower. He was confined there for twelve years and spent his time in literary and scientific research. His release was secured in 1616 by proposing to lead an expedition to the Orinoco River for the purpose of developing a vast gold field that he thought could be found. The enterprise not only proved disastrous, but brought on trouble by Raleigh's men attacking and destroying a Spanish village. He was arrested on returning to England, and was executed on the former sentence that still remained in force. Raleigh was a man of lofty moral impulse and noble presence. He possessed a spirit of rare wit, but had proud and impatient traits that were largely instrumental in bringing about his ruin. While in the Tower he wrote his "History of the World."

RAM, an ironclad ship of war having its bow especially designed and constructed for ramming. Such a vessel has a heavily armored stem at the bow below the line of water and is intended to destroy the enemy's ships by driving against them with great force, the collision being designed to crush the side of the attacked vessel without injuring the ironclad. Vessels of this class were first employed in the Civil War, when the Confederate ram *Virginia* sunk the Federal frigate *Cumberland* at Hampton

Roads in 1862. The ram is now regarded one of the most efficient vessels for coast defense.

RĀMA (rā'mā), in Hindu legends, the hero of the Rāmāyana, who made his appearance in the world at the end of the Treta Yuga or second age, and is called the seventh incarnation of Vishnu. He is generally spoken of as Ramachandra. Two other incarnations of Vishnu bear the name of Rāma, known as Balarāma and Parasa-rāma.

RAMADAN (rām-ā-dān'), the ninth month of the Mohammedan year, the one in which Mohammed received his first revelation. It is for this reason the great annual fast month and festivities are kept up throughout the entire period, from sunrise to sunset. All believers are enjoined to abstain from eating, drinking, and sensual pleasures during the entire day, but food may be taken at night to supply the necessary wants of the body. The obligations enjoined upon believers during Ramadan are treated in the second book of the Koran called *The Cow*. Since the Mohammedan months are reckoned by lunar time, each month begins in each successive year eleven days earlier than in the preceding, hence it occurs successively in all the seasons in a period of 33 years.

RĀMĀYANA (rā-mā'yā-nā), one of the two great epic poems of India, the other being known as Mahābhārata. This poem is the accredited work of Valmiki and recounts the famous exploits of Rama, King of Oude, who was one of the conquerors of Ceylon. It consists of 2,400 stanzas, arranged in seven books, and is thought to have been composed in the 5th century A. D. Many translations and criticisms on this work are extant, since it may be classed as the most celebrated poem in India. The translations of Schlegel are especially noteworthy.

RAMÉE (rā-mā'), **Louise de la**, novelist, born at Bury Saint Edmunds, England, in 1840; died Jan. 25, 1908. In 1860 she settled in London and began to contribute to periodicals under the pen name of *Ouida*, by which she became known extensively. Her first novel was published in 1863 under the title "Held in Bondage," which was soon followed by a number of other productions, many of which have been dramatized. She traveled extensively in Europe and resided for some time near Florence, Italy. Among her best-known productions are "Under Two Flags," "Two Offenders," "A Dog of Flanders," "In Maremma," "Views and Opinions," "Critical Studies," and "Village Commune."

RAMESES (rām'ē-sēs), the name of several kings of Egypt, who are supposed to have reigned about the time the Children of Israel were connected with the Egyptians. Rameses I. was the first sovereign of the nineteenth dynasty. He reigned but a short time and his name appears on the monuments of Thebes. Rameses II. was the grandson of the preceding and is classed as the third king of the nine-

teenth dynasty. His birth is assigned to the 14th century B. C. The inscriptions on various tombs and monuments give him a place as a patron of art and science and a builder of many vast improvements. It was during his reign that the Israelites became sorely oppressed, and under his son, Rameses III., who is generally known by his title, Pharaoh, the exodus of the Hebrews took place. The latter monarch belonged to the twentieth dynasty. Writers generally agree that the mummies of Rameses I. and Rameses II. were found in a pit near Thebes in 1881, and that the mummy of Rameses III. was discovered among papyri and other relics in 1886.

RAMESSEUM, the name of a temple built at Thebes, Egypt, by Rameses II. It was located on the west bank of the Nile, where its ruins attract many tourists. This temple was dedicated to the god Ammon and contained a colossal statue of Rameses II.

RAMIE. See **Boehmeria**.

RAMILLIES (rā-mē-yē'), or **Ramilies**, a town of Belgium in Brabant, 28 miles southeast of Brussels. It is noted as the seat of an important battle in the War of the Spanish Succession, which occurred on May 23, 1706. The French forces were commanded by Marshal Villeroy and the elector of Bavaria, while the allied troops were under the command of Marlborough. The former were defeated with a loss of 13,000 men and France was compelled to abandon its claim to the Spanish Netherlands.

RAMPART (rām'pärt), the embankment surrounding a fort, on which the parapet is raised, and which is designed with the view of resisting cannon shot. It is constructed immediately within a ditch, the lower part of the outer slope being usually made of solid masonry and the remainder being formed by the earth taken from the ditch. The height of the rampart is determined largely by the height of the buildings to be defended and by the character of the region surrounding the fort.

RAMSEY (rām'zī), **Alexander**, statesman, born near Harrisburg, Pa., Sept. 8, 1815; died April 22, 1903. He graduated from Lafayette College and soon afterward engaged in a political career. In 1841 he was made clerk of the Pennsylvania house of representatives and was elected to Congress in 1842 as a Whig, serving four years. He became the first territorial governor of Minnesota, holding that office until 1853. Two years later he was elected mayor of Saint Paul and served as Governor of the State from 1860 to 1863. In the latter year he was elected to the United States Senate, where he served with marked success for twelve years. In 1879 he became Secretary of War under President Hayes and was a member of the Utah Commission in 1882.

RAMSEY, David, soldier and historian, born in Lancaster County, Pennsylvania, April 2, 1749; died May 8, 1815. He graduated from

Princeton College, took a course in medicine, and established a successful practice at Charleston, S. C. His principal writings include "History of the American Revolution," "Life of Washington," and "History of South Carolina."

RAMSEY, Sir William, scientist, born at Glasgow, Scotland, Oct. 2, 1852; died July 23, 1916. He studied in his native city and at Tübingen. In 1872 he was made assistant chemist at Glasgow, after which he held professorships in chemistry at Bristol and London. He discovered the element argon and first showed the changes that take place in radium when it is exposed to the helium of the sun. He published numerous books on the gases of the atmosphere and on inorganic chemistry.

RANC (rän), **Arthur**, author and statesman, born in Poitiers, France, in 1831. He studied in Paris, was admitted to the bar, and on account of opposing the empire was obliged to leave France. The amnesty of 1859 permitted him to return to Paris, but he was imprisoned for publishing articles unfavorable to the government in the *Opinion Nationale*. Gambetta made him director of police in 1870 and the next year he was elected to the National Assembly, but resigned soon after on account of being opposed to making peace with Germany and joined the commune. He published *République Française* and was obliged to leave France a second time, owing to his radical support of communism, but returned after the amnesty of 1879.

RANCH, a term applied in the western part of North America to an establishment for rearing and grazing cattle and other stock in large numbers. The name was derived from the Spanish word *rancho*, meaning a hut or collection of huts in which ranchmen mess and lodge. Ranching has long been an important business and involves the rearing of large herds of cattle, horses, ponies, and sheep. For nearly half a century the ranchmen and cowboys had almost uninterrupted possession of many sections of the great plains, but the region is now penetrated more or less by railroads and limited by agriculturists.

RANDALL (rän'dəl), **Samuel Jackson**, statesman, born in Philadelphia, Pa., Oct. 10, 1828; died in Washington, D. C., April 12, 1890. He first engaged in a mercantile business in Philadelphia, became State Senator in 1858, and served two years in the Union army, attaining to the rank of captain. In 1862 he was elected to Congress as a Democrat, but served again in the army in the Gettysburg campaign. His Congressional service included a period of 28 years and he was speaker of the House from 1876 to 1881. Randall was prominent as a leader of the protectionist wing of the Democratic party, opposed the Force Bill in 1875, and served on a number of important committees. He was held in high esteem by his constituents

and congressmen for his eminent ability and devotion to legislative duties.

RANDOLPH (rän'dölf), **Edmund Jennings**, soldier and statesman, born in Williamsburg, Va., Aug. 10, 1753; died in Frederick County, Virginia, Sept. 12, 1813. He was the son of John Randolph, a royalist, who disinherited him because he sided with the Americans and joined Washington's army. After taking a law course, he was admitted to the Virginia bar. He was a member of the Virginia constitutional convention in 1776, and in the same year succeeded his father as attorney-general. He was a delegate to Congress from 1781 to 1782, Governor of Virginia from 1786 to 1788, and in 1789 became Attorney-General of the United States. President Washington appointed him Secretary of State in 1794 to succeed Jefferson, but he resigned the following year on account of a misunderstanding in relation to the Jay Treaty. Subsequently he practiced law in Richmond, Va., and served as a counsel on the trial of Aaron Burr for treason. He published a history of Virginia.

RANDOLPH, John, statesman, born in Cawsons, Va., June 2, 1773; died in Philadelphia, June 24, 1833. He descended from a wealthy family of Virginia, was a second cousin of Edmund J. Randolph, and traced his ancestry to Pocahontas, the famous Indian princess. His education was secured at Princeton and Columbia colleges. He was elected to Congress as a Democrat in 1799, of which body he remained a member, with the exception of two terms, until 1825, and served as United States Senator for two years, from 1825 to 1827. Randolph was a strict constructionist and was renowned for eloquent satire. His influence as a speaker was enhanced by his wit and eccentricity. He opposed Madison and the War of 1812, and was led into a duel with Clay by styling the union of Adams and Clay a "coalition between the blackleg and the Puritan." His opposition to the War of 1812 caused his defeat for Congress. Randolph attracted more attention than any statesman of his time on account of his decided views in favor of State rights, opposition to alleged usurpation of power at Washington, and the readiness and effect of his oratory. President Jackson appointed him minister to Russia in 1830 and he was elected to Congress in 1832, but died of consumption before taking his seat. Randolph provided in his lifetime for the liberation of his slaves, about 300.

RANDOLPH, Peyton, statesman, born in Williamsburg, Va., in 1723; died in Philadelphia, Pa., Oct. 22, 1775. He graduated from William and Mary College, studied law in London, and in 1748 was given an appointment by the King as Attorney-General of Virginia. In 1765 he prepared the remonstrance passed by the House of Burgesses against the passage of the Stamp Act, and soon after became a member of the House of Burgesses, of which he was

chosen speaker. He was President of the First Continental Congress that assembled in Philadelphia on Sept. 5, 1774, and also when that body reassembled on May 10, 1775, but died of apoplexy the following October.

RANGOON (rāṅ-gōon'), the capital and chief seaport of British Burmah, on the Rangoon River, twenty miles from the sea. The Rangoon River is the eastern branch of the Irrawaddy, and the city is situated along the left bank, its dock being on the opposite side of the river, at the suburb of Da-la. Rangoon is an important railroad and trade center. It is fortified and garrisoned and contains many valuable public buildings. The most noteworthy structures include the government buildings, the Saint John's College, a number of hospitals and schools, and numerous churches, mosques, and temples. A large majority of the people are Burmese, but it has a considerable number of Hindu inhabitants. A city has existed here since many centuries before the Christian era, but its prosperity dates from the 18th century, when it was captured and rebuilt by the Burmese. The British came in possession of it in 1852. It is the seat of rice mills and has manufactures of clothing, lumber products, pottery, and utensils. The trade in timber, ivory, rice, hides, cotton, precious stones, and gums is important. Population, 1916, 236,818.

RANJIT SINGH (rūn-jēt' sīng'h'), noted military leader of the Punjab in India, born Nov. 2, 1780; died June 27, 1839. He was the son of a Singh chief, who died in 1786, and the son received an adequate training in military tactics. His capacity as a military and political ruler induced the Shah of Afghanistan to intrust him with the government of the province of Lahore. It soon became his ambition to unite all the Singh provinces into one dominion, which he did after a decade of earnest and enduring perseverance, thus founding the Singh kingdom. His army of 75,000 men was defeated by the Afghans in 1836, but he still continued absolute sovereign over the territory he had acquired. His reign was one of moderation and stands as a signal success in Asiatic history, being particularly remarkable for the reason that he lacked even the elements of an education.

RANK. See **Relative Rank.**

RANKE (rān'kē), **Leopold von**, eminent historian, born in Wiehe, Germany, Dec. 21, 1795; died in Berlin, Sept. 23, 1886. He studied at Halle, Berlin, and Leipsic, and in 1818 became a tutor in the Frankfort gymnasium. In 1825 he was appointed professor of history in the University of Berlin, a position given him because of his first great historical work, the "History of Latin and Teutonic Nations." Ranke continued to lecture at Berlin until his death. His life was one of remarkable activity, producing not only a large number of works, but many historical productions of value and wide pop-

ularity. His "Prussian History" is a work of twelve volumes that appeared in 1847, and his "History of the Popes of Rome," a voluminous work, has been translated into the language of nearly every civilized people. His last great work is his "History of the World," in twelve volumes, which he completed at the age of eighty years. Ranke was highly honored by the government. He was granted a title of nobility in 1865, became privy councilor in 1882, and his ninetieth birthday, in 1885, was made a national holiday, on which Emperor William called at his residence and personally congratulated him. Among his writings not mentioned above are "History of Germany in the Time of the Reformation," "Princes and People of Southern Europe in the Sixteenth and Seventeenth Centuries," "Servian Revolution," and "History of France in the 16th and 17th Centuries."

RANKIN, Jeannette, public woman, born near Missoula, Mont., in 1882. She graduated at the University of Montana, where she became an instructor in economics, and afterward studied at Seattle, in the University of Washington. Subsequently she traveled extensively, visiting Europe and Australasia, and gave much time to research work in social and economic conditions. In 1914 she conducted a successful campaign for woman suffrage in her State, where the movement for political equality carried, and in 1916 was elected the first woman member of Congress. In her official capacity she favored peace, and in 1917 voted against the war with Germany.

RANSOM (rān'sūm), **Mathew Whitaker**, soldier and statesman, born in Warren County, North Carolina, Oct. 8, 1826; died Oct. 8, 1904. He studied at the University of North Carolina, where he graduated in 1847, and the same year was admitted to the bar. In the Seven Days' Battle he showed great bravery, was wounded at Malvern Hill, and commanded a brigade at Antietam. Soon after he was promoted brigadier general and during the Gettysburg campaign took an efficient part, and in 1864 commanded at the recapture of Plymouth, N. C. General Lee complimented him for efficient service at Hare's Hill in 1865, and he remained active until the surrender at Appomattox Court House. In 1872 he was elected to the United States Senate and served continuously until 1895, when he was made United States minister to Mexico.

RANUNCULUS (rā-nūn'kū-lūs), a genus of herbaceous plants of the buttercup family, several common species of which are known as *buttercup*, or *crowfoot*. The flowers have five or more petals and numerous stamens, and the seeds are grouped into a head or cluster. The leaves of most species are much divided, the roots are bulbous, and some species have acrid and caustic properties. *Buttercups* are among the more common species and are found largely in meadows, while *crowfoots* and *spearworts* are equally well known, the former growing

mostly in pastures and the latter in marshes and wet places. More than a hundred species have been described. A double-flowered variety, known as *bachelor's button*, is cultivated in some regions as a flowering plant. It has a tall stem and white or yellow flowers.

RAPE, a biennial plant which is cultivated extensively in Europe, principally for the leaves and the seed. It is closely related to the cabbage family, but it has a root like that of the turnip, this portion being esculent and useful as an article of food. A species known as *summer rape* is well known in England and France, being cultivated largely for *colza oil* obtained from the seed. This oil is used for machinery and lamps in lighthouses. The seed is fed to cage birds. Rape is not only valuable as a forage crop and for the root and seed, but is useful to plow under as a fertilizer.

RAPHAEL (răf'ă-ěl), or **Raffaello, Sanzio**, one of the most eminent painters of the world, born in Urbino, Italy, April 6, 1483; died at Rome, April 6, 1520. He was the son of Giovanni Sanzio, a painter, who died in 1494. From him the son received his first instruction, but he was afterward intrusted to the care of an uncle, who placed him in the studio of Perugino at Perugia. He was instructed under this eminent painter for a term of six or eight years. He went to Florence in 1504, where he painted until 1508, and then was invited to Rome by Pope Julius II. His paintings were at first influenced to some extent by the manner of Perugino, but at Florence he began to develop a new and independent style of artistic work by studying the productions of the great masters.

It may be said that Raphael acquired simplicity and strength of outline from Michael Angelo, a depth of coloring from Fra Bartolommeo, and grace of expression from Leonardo da Vinci. His Florentine productions include "Christ Bearing the Cross," "Madonna," "Holy Family," and "The Marriage of Joseph and the Virgin." After reaching Rome, he was engaged to assist Bramante in embellishing the Vatican, in which he executed many famous frescoes. These include "Dispute of the Fathers of the Church" and "School of Athens," both in the second chamber. Other frescoes in the Vatican are "The Fall of Adam," "Solomon's Judgment," "Temperance," "Astronomy," "Emperor Justinian Delivering the Roman Law to Tribonian," "Gregory X. Giving the Decretals to an Advocate," "Leo the Great Stopping the Progress of Attila," "Moses Viewing the Burning Bush," "Deliverance of Peter from Prison," "Building of the Ark" and "Jacob's Dream."

Raphael's works are generally grouped in three classes, including those executed in the manner influenced by Perugino, those produced under his Florentine style from 1504 to 1508, and those executed after settling in Rome. Transition to the latter style is first recog-

nized in his "Dispute of the Fathers of the Church." Though each style has its peculiar merit, it may be said that his last manner exhibits the most classical features, since it was influenced largely by his contact with numerous productions of the classical period. The last famous work undertaken by him is his "Transfiguration of Christ," which was left in an unfinished state at his death and may be seen in the Vatican.

RAPIER (ră'pĭ-ēr), a straight sword used only for thrusting. The blade is highly tempered and finely pointed and was formerly used very extensively in duels among military men. At present it is employed in state ceremonials.

RAPPAHANNOCK (răp-pă-hăn'nŭk), a river in Virginia, which has its source in the Blue Ridge Mountains, and, after a course of 225 miles toward the southeast, flows into Chesapeake Bay by an estuary about 70 miles long. It is navigable to Fredericksburg, 110 miles. The principal tributary is the Rapidan. On these two rivers occurred the important battles of Fredericksburg, Chancellorsville, and the Wilderness, in the Civil War.

RARITAN (ră'ĩ-tan), a river of New Jersey, which rises in Morris County and flows southeast into Raritan Bay. It is 70 miles long and is navigable to New Brunswick. The Delaware and Raritan Canal joins it at that city, connecting it with the Delaware River and forming a short route between New York and Philadelphia.

RASK (răsk), **Rasmaus Christian**, noted philologist, born near Odense, Denmark, Nov. 22, 1787; died Nov. 14, 1832. He studied at the University of Copenhagen and later made an extended visit to northern Russia, Sweden, and Iceland with a view of making a study of the Scandinavian languages. In 1818 he published "Researches Concerning the Origin of the Icelandic or Ancient Language of the North." Shortly after he secured government aid to travel through Russia, Persia, Arabia and India, and spent some time studying Sanskrit in the last named country. He visited Astrakhan to study the language of the Tartars and made his return journey through Turkey, reaching Copenhagen in 1823. Two years later he became professor of literary history in the University of Copenhagen, and was made teacher of Oriental languages in 1828. His death resulted from his energies becoming exhausted by hard work. Rask is the author of several grammars and numerous works on history and philology, including "Ancient Egyptian Chronology," "Anglo-Saxon Grammar," and "Oldest Hebrew Chronology."

RASPBERRY (răz'bĕr-rŷ), a shrubby plant belonging to the same genus as the blackberry. It is cultivated extensively as a garden fruit. The old plants have many suckers, the stem is characterized by slender prickles, and the leaves are pinnate. It is native to America and the

northern part of Europe and Asia. The cultivated species have been greatly improved and about 500 different kinds have been described. They include red, yellow, and black species and the fruit resembles the strawberry in not becoming acid in the stomach. The ripened fruit is used in making jam, jelly, and various liquors and is eaten as a dessert. Different kinds of medical preparations are made of it, including compounds of use in fevers and for expector-



RASPBERRY.

ants. Wild species are found in many sections of the United States. The raspberry is cultivated throughout the southern part of Canada.

RAT, a class of rodent mammals belonging to the mouse family, but including only the larger species. A number of species have been described. They infest houses, barns, and ships. Most rats have a slender head and a long, scaly tail. The *Norway* or *brown rat* is about nine inches in length, and is the largest and most powerful. The *black rat* has a somewhat shorter body, a longer tail, and larger ears. These two kinds are native to Central Asia, where other allied species also prevail. Rats were unknown in Europe until the 16th century, when the black rat made its appearance, and about two centuries later the brown rat became common to the western part of that grand division. Both are now distributed in America and are hostile to each other. The brown rat being stronger, it either kills or drives the black rat from a locality when it once gets a permanent foothold. Rats feed on many kinds of animal and vegetable food, and to obtain it they burrow in the ground or gnaw through wooden structures. They devour eggs, small poultry, birds, grain, and vegetables and make their way into warehouses and dairies. The rat multiplies very rapidly. Its flesh is eaten only by rude tribes and animals, though its skin is used to a considerable extent

in making gloves. The *white rat* belongs to this class of animals and is frequently seen as a household pet. A species known as the *cotton rat* is common to the southern part of the United States.

RATCHET (răch'ět), a mechanism for holding or propelling a ratchet wheel. It consists of a pawl or click, which fits into the teeth of a circular wheel, as in the carriage of a typewriter, where it turns a wheel by degrees. The windlass and derrick furnish an example of a ratchet that prevents the backward movement of a wheel.

RATEL (ră'těl), a mammal of the badger family, sometimes called *honey badger* from its fondness for honey. The size is that of the badger, but it is somewhat heavier and has a less projecting nose. The ratel native to South Africa burrows in the ground for its dwelling and searches for the nests of wild bees, against whose sting it is protected by its loose and leathery hide. The ratel of Asia has a shorter tail, is about three feet in length, and is nocturnal in its habits. It feeds on small animals and insects and is said to prey upon imperfectly buried human bodies.

RATIO (ră'shî-ô). See **Proportion**.

RATIONALISM (răsh'ün-ăl-iz'm), a term employed to denote a system of theology in which reason is the supreme guide. It stands in opposition to *supernaturalism*, which is the doctrine of a supernatural agency in the matters of faith and morals. While rationalism is founded upon physical or natural causes, supernaturalism assigns revelations to a divine agency. As a doctrine rationalism had its rise in Germany at the time of the Reformation, when the Roman Catholic Church held to the doctrine of infallibility as a central dogma. In 1521 Martin Luther declared at the diet of Worms: "Unless I am refuted and convinced by proofs from the Holy Scriptures, I yield my faith neither to the Pope nor to the council alone." In this doctrine Luther was joined by Zwingli and Calvin, and in 1530 was published the Confession of Augsburg. Kant used the term rationalism in considering the tendency which claims for the unaided human reason the right of deciding in matters of faith. In this sense it departs from the teachings of Luther, since it considers all sources of information and leaves to the human reason the important decision of matters of faith, without regard to the authority of councils or the Scriptures.

RATISBON (răt'is-bön). See **Regensburg**.

RATON (rà-tôn'), a city in New Mexico, county seat of Colfax County, twenty miles south of Trinidad, Colo. It is on the Atchison, Topeka and Santa Fé Railroad, and is surrounded by a farming and stock-raising country. In its vicinity are productive deposits of coal. The principal buildings include the county courthouse, the high school, and a number of churches. It has grain elevators, stock yards,

and extensive railway shops. Population, 1900, 3,540; in 1920, 5,544.

RAT PORTAGE, or **Kenora**, a city of Canada, in the western part of Ontario, 130 miles east of Winnipeg, Manitoba. It is a port of entry on the northern shore of the Lake of the Woods, has communication by the Canadian Pacific Railway, and is surrounded by a lumbering and gold-mining district. The chief buildings include the high school, the armory, and the Commercial and King Edward hotels. It is noted as a summer resort. Fine water power is furnished by the Winnipeg River, which has a fall of twenty feet. The manufactures include flour, machinery, clothing, and lumber products. It has an extensive trade in merchandise and lumber. Population, 1901, 5,202; in 1919, 6,885.

RATTAN (răt-tăn'), the name applied commercially to the long and flexible stems of several species of climbing palms and to the more rigid stem of certain erect palms. The former are very tough and strong and are used for many purposes, such as making ropes, seats of chairs, cables, baskets, mats, hats, and various kinds of wickerwork. The stems of the erect palms are used mostly for walking sticks. Rattan is produced largely in Sumatra, Java, and other islands southeast of Asia. It is sold in the export market in bundles of 100 canes, each measuring from fifteen to twenty feet in length.

RATTLESNAKE (răt't'l-snāk), the general name of several species of venomous snakes, so named because of having a series of horny scales at the end of the tail, which clash together with a rattling sound when the tail is vibrated. The rattle is a complicated organ and appears in very young rattlesnakes, before they have shed their skin for the first time. When the skin is renewed a new joint appears next to the body of the snake, while the old one is not cast off with the remainder of the epidermis. Thus, there are as many loose joints in the rattle as there have been renewals of the skin of the snake, though the number does not indicate the age of the snake, since the skin is changed oftener than once a year, but it does indicate the number of changes of skin that the animal has undergone. The rattles are dry, horny, and cup-shaped, each fitting over a portion of the preceding and tapering toward the farther end. They give off a peculiar sound when shaken, unless wet by rain or dew, when no sound can be produced.

Rattlesnakes are natives to America, and include about fifteen species. They are sluggish in habit, but pursue squirrels, rabbits, mice, and other animals upon which they prey with considerable skill. The poison is one of the most deadly found in serpents and penetrates rapidly and with deadly effect the nerve centers. The *prairie rattlesnake* attains a

length of about three feet and is found in many sections of the western states, where it shares burrows in common with prairie dogs and owls. The *banded rattlesnake* occurs east of the Mississippi and reaches a length of from four to six feet. Other and larger species are



PRAIRIE RATTLESNAKE.

found in Mexico, Central America, and South America.

RAUCH (rouk), **Christian Daniel**, distinguished sculptor, born at Arolsen, Germany, Jan. 2, 1777; died at Dresden, Dec. 3, 1857. He studied sculpture at an early age, but at the death of his father, in 1797, went to Berlin. While there he became valet to Emperor Frederick William III., who recommended him to the Academy of Fine Arts. In 1804 he visited Rome, where he became acquainted with Thor-



CHRISTIAN DANIEL RAUCH.

waldsen and Canova and received patronage from William Humboldt, then Prussian minister at Rome. The King of Prussia called him to Berlin in 1811 to execute a monumental statue of Queen Louisa, a work which established his fame. This production is now in the garden of Charlottenburg, at the mausoleum of the queen, and a second statue of the queen by him is in the palace of San Souci, near Potsdam. The latter work occupied his time for eleven years and is regarded among the famous masterpieces of sculpture. Other noted productions include statues of Schiller, Goethe, Schleiermacher, Dürer, Maximilian of Bavaria, and Field Marshal Blücher. The magnificent monument of Frederick the Great in Berlin is his greatest work, which was completed after

twenty years of labor, and was dedicated with great pomp in 1851. Rauch was a tireless laborer and is the designer and executor of many ideal busts in marble, several of which are of colossal size.

RAUHES HAUS (rou'ēs hous), meaning rough house, an institution founded near Hamburg, Germany, by Johann Heinrich Wichern. It is located at a suburb named Horn and is managed as an adjunct to the German Home Mission. This institution was opened in 1831, and has since grown into an important institution for the culture of children—physically, intellectually, and morally. An artisan is appointed for the supervision of families of children, usually about twelve, and they are instructed in different elementary branches of study and are trained to do all classes of useful household and outdoor labor. The institution somewhat resembles an industrial school, with the addition of special efforts to inculcate moral tendencies and ability for various occupations, such as teaching, superintendence, clerking, etc.

RAVEN (rā'v'n), a species of crow, widely distributed and remarkable for its large size. It is about two feet from the bill to the tail, and its extended wings measure nearly three feet. The plumage is glossy black. Its bill is thick and short, the tail is rounded, and its flight extends high into the air. Ravens are able to scent carrion a distance of several miles, which causes them to congregate in the vicinity of dead animals, their favorite food, but they also feed on fruits and tender shoots of plants. They are noted for being long-lived and may be taught to imitate human speech. The ravens are noted in literature, being the first birds to be mentioned in the Old Testament, and they are alluded to in classic mythology as an ill omen. Shakespeare mentions the appearance of the raven as foreboding misfortune, while Poe makes it a prominent figure in "The Raven."

RAVENNA (rā-vē'nā), a city of Italy, capital of a province of the same name, four miles west of the Adriatic Sea and 42 miles southeast of Bologna. It is located in a fertile region, has wide streets, and is surrounded by walls. In former times the sea extended to the city, but now its harbor is silted up, and the connection with the Adriatic is by a canal. A railroad line connects it with the great railroad system of northern Italy, giving it convenient trade facilities. Among the manufactures are silk textiles, pottery, utensils, clothing, musical instruments, and machinery. Its streets are adorned with a number of statues of the popes and the city is generally rich in monuments of art. The principal buildings include a cathedral dating from the 4th century, numerous other churches, and a library containing 100,000 volumes. It has numerous educational institutions, museums, gardens, and parks. Among the municipal facilities are electric lights, waterworks, pavements, and telephones.

Ravenna is a very ancient city, and is thought to have been founded by the Umbrians. Emperor Honorius made it the capital of the Roman Empire, but its greatest prosperity was attained under Theodoric the Ostrogoth, who was buried here. It became the metropolis of the Lombardic kingdom in 1752, but the Lombards were expelled by Pepin and Charlemagne, who presented it to the Pope. It continued as an exarchate to the Pope until 1860. Population, 1916, 64,031.

RAWLINS (rā'linz), a city of Wyoming, county seat of Carbon County, 135 miles west by north of Laramie. It is on the Union Pacific Railroad and is surrounded by a mining and sheep-raising country. The features include railroad machine shops, the county courthouse, the high school and the State prison. It has electric lighting, public waterworks, and a large commercial trade. Limestone and building stone are quarried in the vicinity. Population, 1905, 3,617; in 1910, 4,256.

RAWLINS, John Aaron, soldier, born in East Galena, Ill., Feb. 13, 1831; died in Washington, D. C., Sept. 9, 1869. He attended public school and engaged as a charcoal burner, but later studied law. In 1854 he became a member of the Illinois bar and established a successful practice at Galena. He was elected city attorney in 1857, supported Douglas for the presidency, and opposed armed liberation of the slaves. However, at the beginning of the Civil War he gave hearty support to the administration, and became aid-de-camp to General Grant. He accompanied that military leader in practically all the campaigns and battles from Cairo to Lee's surrender, entering the service with the rank of captain and attaining that of major general. President Grant selected him as Secretary of War in 1869, a position he held until his death.

RAWLINSON (rā'lin-sūn), **George**, historian, born at Chadlington, England, Nov. 23, 1812; died Oct. 6, 1902. He attended the Swansea and Ealing School, graduated at Trinity College, Oxford, in 1838, and in 1840 was made fellow in Exeter College. In 1861 he was elected Camden professor of ancient history at Oxford University, and was appointed canon of Canterbury Cathedral in 1872. From 1888 until his death he was rector of All Hallows' Church, London. In connection with his brother, Sir Henry C. Rawlinson, he published a valuable work entitled "History of Herodotus." His works include "Manual of Ancient History," "History of Ancient Egypt," "Story of Parthia," "History of Phoenicia," "Five Great Monarchies of the Ancient World," "Seventh Oriental Monarchy," "Historical Illustrations of the Old Testament," and "The Origin of Nations." In 1859 he was Bampton lecturer, and the following year his lectures were published under the title of "Historic Evidence of the Truth of Christian Records."

RAWLINSON, Sir Henry Creswicke, soldier and diplomat, born in Chadlington, England, April 11, 1810; died in London, March 5, 1895. He was educated at Ealing, Middlesex, and in 1826 entered the military service in India, serving in the Bombay presidency until 1833. In the latter year he reorganized the Persian army and served in Afghanistan from 1840 to 1843. He was consul at Bagdad in 1850 and became consul general for Turkey in 1851. He was made director of the East India Company in 1856 and soon after returned to India, whence he was sent in 1859 as special envoy to the Shah of Persia. Rawlinson made a special study of cuneiform inscriptions in Persia and other Oriental countries, and in 1871 became president of the Royal Geographical Society. He joined his brother, George Rawlinson, in making a translation of Herodotus, and aided George Smith in publishing "Cuneiform Inscriptions of Western Asia." He sat as a Liberal in Parliament for a number of years, received a baronetcy in 1891, and contributed a number of articles on geography to magazines and encyclopedias. His principal work is a publication of Eastern political affairs, entitled "England and Russia in the East."

RAY, a genus of cartilaginous fishes. They are generally divided into numerous families, including the sawfishes, electric rays, skates, sting rays, and the eagle rays. The *sawfishes* have an



- RAY.

1, Florida Sting Ray; 2, Common Skate.

elongated body and a peculiar prolongation of the snout, armed with from three to five cartilaginous tubes. This snout prolongation is called the *saw*, and is a formidable weapon of defense, with which it is able to tear open the body of its prey to feed on the vitals. The *electric ray* has peculiar organs by which it is capable of generating electricity as a means of defense, or to kill the smaller animals on which it feeds. Its body is smooth and naked. The *skate*, or *thorn-back ray*, is so named from the peculiar curved spines, while the *sting rays* are peculiar for their vertical fins and barbed spine, with which they are able to inflict painful wounds. In the *eagle rays* the pectoral fins are highly developed, the body is dilated, and the tail is very thin. More than a hundred species of rays have been described. Some weigh only a few ounces, while others attain a weight of 1,500 pounds. Many species of the genus are distributed more or less widely in all the seas.

RAYMOND (rā'münd), **Henry Jarvis**, journalist, born in Lima, N. Y., Jan. 24, 1820; died in New York City, June 18, 1869. In 1840 he graduated from the University of Vermont and was shortly after selected by Horace Greeley as assistant editor of the *New York Tribune*. He became editor of the *Courier and Enquirer* in 1843 and in 1851 founded the *New York Times*, one of the leading journals of the United States. He became a member of the New York Legislature in 1849, was made speaker in 1850, and became Lieutenant Governor of the State in 1854. In 1864 he was elected to Congress as a Republican, but declined reelection two years later to devote himself to journalism. His death resulted from an attack of apoplexy. He wrote "Life and Public Services of Abraham Lincoln" and "Life of Daniel Webster."

RAZOR (rā'zēr), a knife of a peculiar shape and with a keen edge, used to shave the hair from the face or the head. The best quality of steel is used in making razors and the sides of the blades are usually drawn or ground concave. The blade is held to the handle by a rivet, which facilitates turning it in a position most convenient for shaving. Razors of this kind are used exclusively by barbers, while safety razors, which are fitted with a guard to prevent cutting the face or head, are employed in personal shaving.

RE (rā), the name of the ancient sun god of the Egyptians. He is credited with overcoming the powers of darkness and is said to have turned chaos into order and system. In old age he was overcome by the goddess Isis. He was supposed to be the ancestor of the Pharaohs, who assumed the title of *Son of Re*.

RE (rā), an island of France, in the Bay of Biscay, belonging to the department of Charente Inférieure. It is seventeen miles long and four miles wide.

Oysters, wine, and salt are the principal products. The island is located opposite La Rochelle and is strongly fortified. Population, 1916, 14,534.

READ, Opie Percival, author, born in Nashville, Tenn., Dec. 22, 1852. He was educated at Neophogen College, Gallatin, and after graduating took up journalistic work at Little Rock, where he afterward founded *The Arkansas Traveler*, a weekly publication devoted to literature and humor. Later he removed to Chicago and engaged largely in literary work. He became highly popular as a platform and Chautauquan lecturer. Among his best known writings are "Len Gansett," "A Tennessee Judge," "A Kentucky Colonel," "Emmett Bonlore," "Wives of the Prophet," "The Jucklins," "Opie Read in Arkansas," "The Carpetbagger," "Twenty Good Stories," and "Our Josephine and Other Tales."

READ, Thomas Buchanan, poet and painter, born in Chester County, Pennsylvania, March

12, 1822; died in New York City, May 11, 1872. He studied the elements of sculpture and painting in Cincinnati, Ohio, and spent several years in traveling through various states, supporting himself by sign painting and occasionally working as a cigar maker. In 1846 he opened an art studio in Philadelphia, but went to Italy in 1850, visiting Florence. Later he established his permanent residence at Rome, though he continued to make occasional visits to the United States. He spent considerable time painting scenes from personal observations in the Civil War and at that time wrote his best known single poem, entitled "Sheridan's Ride." Other productions include "Female Poets of America," "House by the Sea," and "Wagoner of the Alleghanies." His principal paintings embrace "Sheridan and His Horse," an illustrative work of the above mentioned poem, "Spirit of the Waterfall," and "Lost Pleiad."

READE (rēd), **Charles**, eminent novelist, born at Ipsden House, in Oxford, England, June 8, 1814; died April 11, 1884. He graduated from Oxford in 1835, studied law, and was called to the bar of Lincoln's Inn in 1843. However, his inclination turned toward literature, but he did not publish any productions until 1850, when his story of "Peg Woffington" appeared. This work was afterward dramatized by him in conjunction with Tom Taylor and became known as "Masks and Faces." The writings of Reade are full of energy and bear marks of strong moral purpose, though in some the style is rugged and often crude. It was his purpose to recount many of the abuses in the prison system of England, the mismanagement of its hospitals, and the oppression practiced by trades unions. Incidents in relation to these matters were interwoven with imaginary narratives, and the whole was given a dramatic form easily adaptable to the uses of the stage. Among his best known works are "It Is Never Too Late to Mend," "Griffith Gaunt," "A Terrible Temptation," "The Course of Love," "Christie Johnstone," and "The Cloister and the Hearth."

READE, John, journalist and author, born in Ballyshannon, Ireland, Nov. 13, 1837. He was educated at Queen's College, Belfast, and removed to Canada in 1856. Soon after he founded the *Montreal Literary Magazine*. He became a minister of the Anglican Church in 1854, but continued to give much attention to literary work. Several distinguished honors were bestowed upon him, including fellowship in the Royal Society of Great Britain. His books include "The Making of Canada," "The Prophecy of Merlin and Other Poems," and "Literary Faculty of the Native Races of America."

READING, the art of perusing written or printed matter to ascertain and consider its contents or meaning. The subject as a whole is divided into oral and silent reading. *Oral reading* is closely associated with elocution, as

it involves giving proper oral expression to thought and sentiment, though the latter term has particular reference to the higher department of reading. *Silent reading* is the art of practice of reading to one's self, or the art of perusing written or printed matter without uttering aloud the words. It is merely seeing the thoughts through the words. Skill in both oral and silent reading is made an objective point in studying the subject, but it may be said that silent reading is the more important of the two, since the larger part of our study is from printed pages with the view of getting thought and meaning. However, oral reading is a fine art, and skill in it should be regarded a valuable accomplishment. Many of the noted actors and public readers have been as highly honored as the eminent musicians; it is difficult to say whether the higher praise is due to Charlotte Saunders Cushman (q. v.) or Jenny Lind.

While the subject of reading is of interest to all, it has special elements of importance to teachers of children and youth. A comparatively small proportion of teachers in the common schools have been as well equipped to teach reading as its importance demands, but there is a notable improvement in ability to instruct as well as in the methods employed, especially in the states where an adequate number of normal schools and institutes have been provided for the equipment of teachers. The lack of thoroughness in reading may be attributed at least partially to the circumstance that many educators have looked upon it as secondary to grammar, mathematics, and other sciences. However, it is to be noted that many academies and schools of higher learning are employing special teachers of reading and elocution. On the other hand, public schools are becoming equipped with professionally trained teachers in the primary branches, who are cultivating a taste for reading and laying a foundation for wholesome advancement in both thought gathering and expression.

Much has been said and written on the art of teaching reading. Many plans of instruction have been proposed, among them the so-called alphabet, word, object, phonetic, synthetic, and sentence methods. The *alphabet method* was formerly in general use. By it the pupil is taught the letters of the alphabet before an effort is made to teach reading. It differs from the *word method*, in that by the latter the children are taught to recognize words as wholes rather than to learn them by noticing the individual letters of which they are composed. The *object method* is quite similar in many respects to the word method, but differs from it in that the attention of the learner is directed to objects instead of names. Usually pictures as well as objects are used in conversational lessons. Both the *phonetic* and *synthetic* methods consist chiefly in teaching the elementary sounds of the language, but in the latter greater stress is laid

upon the importance of articulating the particular sounds and using them in building words. This is done by the learner uttering them as distinct sounds, by repeating in concert, and by singing them according to a scale or in verse. In the *sentence method* the beginner is taught sentences rather than letters or words. It is based upon the theory that the sentence is the unit of language and that we think in sentences.

While all the methods of teaching reading possess merit, it may be said that there is no arbitrary plan by which reading can be taught successfully to all students. The most feasible way is to become acquainted with all the methods and use them in combination as the particular needs of the pupil or classes may require. Much depends upon the ability and tact of the teacher. However, it should be aimed to lay a basis for advanced reading, whereby the mind may be trained to become active and scrutinizing. In all grades of teaching the instructor needs to keep in mind the mental, vocal, and physical elements. The *mental element* is that by which we understand and feel what we read, and embraces the intellectual and emotional powers. The *vocal element* pertains to the voice, and is concerned with pronunciation and modulation. *Pronunciation* is the art of uttering words correctly. It includes articulation and accent. *Modulation* is the variation of voice in speaking and reading. The *physical element* in reading is concerned with the body and embraces breathing, facial expression, posture, and gesture. In reading much depends upon example and imitation. Hence, the teacher should be a good reader in order to obtain the most satisfactory results. He needs to inculcate the power of thought getting and the ability to convey meaning when reading. The habit of accurate reading, once acquired, is a source of much profit. It makes a good book a useful companion. See **American Literature; Literature.**

READING (rĕd'ing), a town of Massachusetts, in Middlesex County, ten miles north of Boston. It is on the Boston and Maine Railway and is noted as a favorite residential center. A public library, waterworks, and electric lighting are among the municipal improvements. It has manufactures of rubber goods, musical instruments, clothing, machinery, and boots and shoes. It was settled in 1638 and incorporated in 1664. Population, 1905, 5,682; in 1920, 7,439.

READING, a city of Pennsylvania, county seat of Berks County, 58 miles northwest of Philadelphia. It is on the Schuylkill River, the Schuylkill Canal, and the Pennsylvania, the Philadelphia and Reading, and the Wilmington and Northern railroads. The site is regularly platted and includes about eight square miles, and the locality is more or less rolling or hilly. East of it is Mount Penn and south is Never-sink Mountain, both of which are reached by electric railways. These eminences have a height of about 995 feet, hence afford a fine outlook

over the surrounding country and have provisions for entertaining tourists and visitors. Many of the streets are paved with stone and macadam and traversed by a system of electric railways, which furnish communication with many points and cities in the eastern part of the State.

The city has a fine system of public schools with courses ranging from the kindergarten to the high school. It is the seat of the Inter-State Commercial College, the Schuylkill Seminary, and a number of charitable institutions and hospitals. Near the city, at Kutztown, is the Keystone State Normal School. In the northern part of the city are the grounds of the county fair. The Lutheran Trinity Church, the county courthouse, the Federal building, the city hall, and many fine churches are among the noteworthy public buildings. Much of the architecture in the city is modern and substantial, especially the business blocks and office buildings, such as the Baer building and the Colonial Trust building.

Reading is situated in a region of anthracite coal mining, but the agricultural resources are well developed. Here are located the extensive shops of the Philadelphia and Reading Railway. The manufactures include paper, hosiery, pipe tobacco and cigars, machinery, malt liquors, pottery, and iron and steel products. Extensive interests are vested in the manufacture of letter boxes and steel projectiles. It has a large wholesale and jobbing trade and is a market for cereals, live stock, and fruit. The region was settled by Germans in 1748 and a large per cent. of the people are of German descent. It was incorporated as a borough in 1783, but was chartered as a city in 1847, when it had a population of 12,000. Population, 1920, 107,784.

READING, a city of England, in Berkshire, 35 miles west of London. It is at the junction of several railways and has additional trade advantages because of being near the junction of the Kennet and Thames rivers. Among the notable buildings are the Benedictine Abbey, founded in 1120, and the Church of Saint Lawrence, a structure of the Norman type. It is the seat of several hospitals and educational institutions. The surrounding country is fertile. Among the manufactures are silk goods, machinery, spirituous liquors, flour, and earthenware. Reading was important as early as 871, when it was occupied by the Danes. Population, 1921, 75,214.

REAGAN (rĕ'gan), **John Henninger**, statesman, born in Sevier County, Tennessee, Oct. 10, 1818; died March 6, 1905. He removed to Texas in 1839, which was then an independent republic, and after studying law was admitted to the bar. In 1852 he was elected judge of the ninth judicial district, serving until 1857, when he was elected to Congress. He resigned his seat in Congress in 1861 to take part in the secession convention of his State, in the same year was

made Postmaster-General of the Confederate States, and in 1865 entered the Cabinet of President Davis as Secretary of the Treasury. In 1865 he was taken prisoner and confined in Fort



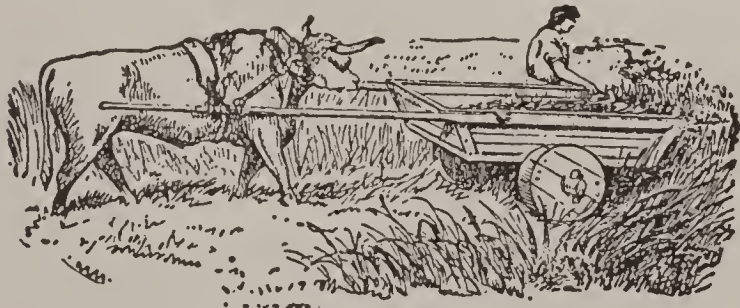
Warren several months. He took part in the State constitutional convention of 1875, the same year was elected a member of Congress, and served continuously until 1886, when he was elected to the United States Senate. In 1891 he resigned his seat in the Senate to become chairman of the Texas State railroad commission. He and Senator Cullom were joint authors of the Cullom-Reagan Interstate Commission Act.

REAL ESTATE, the property which consists of lands, tenements, and hereditaments. In law real property does not only consist of land itself, but includes all immovable effects upon it, such as timber, minerals, and buildings. This class of property is distinguished from *personal property*, which consists of movable effects, such as money, furniture, and live stock.

REALISM (rē'al-iz'm). See **Idealism**.

REAL SCHOOLS, in German *Realschulen*, a class of educational institutions maintained in Germany. They take a place immediately between the elementary school and the university. There are two classes of real schools, the higher preparing for certain courses in a university and the lower fitting for professions that require no university education. The higher grade is the real gymnasium, as opposed to the gymnasium proper, or classical school.

REAPING, the act of cutting down and gathering grain, as in harvesting wheat, oats, or corn. Reaping is as old as human history, though the instruments used in early times were greatly different from those now employed. The



ANCIENT REAPING MACHINE.

oldest known device for cutting the grain is a *reaping hook*, or *sickle*. It was employed by the ancient Jews and Egyptians, and continued in use by the civilized nations down to the latter part of the 19th century. The sickle consists of a curved instrument about two feet in length,

having a wooden handle, and tapering from a width of about two inches near the handle to a point at the opposite end. The edge is sometimes serrated, but generally is plain and sharp like a knife. It is held in the right hand by the harvester, who cuts the standing grain near the surface, holding a handful of it by the left hand. The first few handfuls of grain are made into a band, which is laid on the ground, and when a sufficient amount of grain has been cut and laid on the band, it is bound around it to form the *sheaf*. After a number of sheaves, usually twelve, have been bound in this way, they are set up to form the *shock*, in which position the grain is left on the field until sufficiently cured, when it is placed in the stack or barn mow to be threshed.

The process of reaping described here is one that the writer personally witnessed in the harvest fields both of Australia and America, but it has now given way to harvesting by machinery, in which the same work is done by mechanical devices that quite successfully take the place of the human hand. However, improvement in this line was brought about by a long



MODERN REAPING MACHINE.

period of evolution, the ordinary *scythe* following the sickle, that in turn giving way to the *cradle*, until finally the machines were produced that are drawn by animals or steam power. The ancient methods of reaping are still used by primitive peoples and to a limited extent in Asia and Spanish America. In some countries, as in ancient times, the harvester cuts the grain by hand and places it in a wooden cart moved by an ox or some other animal. This method is advantageous where the grain is quite ripe and dry, thus insuring it against molding or decay, and it is usually customary in such cases to cut little more than the heads, the remaining portions of the standing grain being either plowed under or used for pasture. See **Harvesting Machinery**; **Mowing Machine**.

REASON (rē'z'n), the mental faculty by which man is able to distinguish truth from error, and which places him in the scale of life far above the lower animals. It comprises conception, judgment, reasoning, and the intuitional faculty, and in the philosophy of some writers there is a shade of identity between reason and understanding. Reason can exercise itself on the most abstract and spiritual theories, as well

as on those of a simpler character. It was formerly believed that of all visible creatures man alone possesses reason, but most writers within the last century expressed views favorable to the theory that animals possess some power of reason, a position now generally accepted. It may be that their actions are due to the association of ideas or to instinct, but the former principle is associated with reason.

RÉAUMUR (râ-ō-mür'), **René Antoine Ferchault de**, naturalist and physicist, born in La Rochelle, France, Feb. 28, 1683; died Oct. 17, 1757. He was the son of a French nobleman, was educated in his native city, and made a specialty of studying mathematics, natural history, and physics. In 1703 he removed to Paris, where he published several treatises on geometrical problems, and in 1708 became a member of the Academy of Science. Among his discoveries in natural history are several in connection with the fossil remains found in the rivers and mines of France, his researches enabling him to make a valuable collection of fossil remains of extinct animals. In 1725 he published details of the mode of producing steel from iron and described the method of tinning iron. In 1731 he invented the thermometer that bears his name and in 1739 experimented in making pottery. Réaumur discovered a process of making porcelain quite equal to that manufactured in Saxony and Japan. His papers and published works treat of numerous phases and branches of science, the most important being his "History of Insects," a work in twelve volumes.

REBELLION OF 1838, a revolt against the government of Upper and Lower Canada, brought about largely through the unpopularity of the manner in which the public affairs were organized. A small class of descendants from the Loyalists largely dominated the political forces for several decades. They became known as the *Family Compact*, which, it was alleged, was maintained to monopolize the public offices. The popular dissatisfaction was enhanced by the apparent frauds in disposing of certain public lands in Lower Canada, where the discontents were under the leadership of William L. Mackenzie (q. v.). At the same time a large faction rose against the government in Upper Canada, under the leadership of Louis J. Papineau (q. v.). In the latter section the contest was largely between the French constituents and the Popular Assembly on the one hand and the English, representing the Governor and the Legislative Council, on the other. In both instances the disturbances were subdued by force of arms. Soon after, in 1841, the two provinces were united by an act of the British Parliament.

RÉCAMIER (râ-kâ-myâ'), **Madame**, noted woman of society, born in Lyons, France, Dec. 4, 1777; died May 11, 1849. Her maiden name was Jeanne Bernard. She was the daughter of a wealthy banker and possessed remarkable grace and rare beauty. After attending the con-

vent of La Deserte, where she was trained under the care of an aunt, she was taken by her parents to Paris, and in 1793 married M. Jacques Récamier. He was nearly thrice her age, a man of wealth, and she became enabled to mingle in the society of Paris with a brilliancy and triumph almost without a parallel in Europe. As she was fond of literature, she filled her salon with the finest productions, and made her home the gathering place of the most fashionable and influential literary and political society. Her influence in social and political affairs was remarkable, and she was frequently spoken of as the unacknowledged legislator, since numerous legislative acts were attributed more or less directly to the influence she exercised over a large number of prominent individuals. The fortune of her husband was entirely spent and in 1806 she visited Madame de Stael at Coppet, Switzerland, where the latter had gone after being banished by Napoleon. Her husband died in 1845 and although she had a number of proposals to marry again, among them one from Prince August of Prussia, she remained unmarried. She made a reputation as one of the most noted society queens of France.

RECEIPT (rê-sêt'), a written document which acknowledges the delivery of money or goods. One who makes tender of money or property under contract may demand a receipt therefor in writing as a condition precedent to the delivery thereof. Such a receipt may be given in part or in full payment of a debt. It is evidence of the discharge of a debt or part of the debt which it includes, but may be set aside by evidence that shows beyond a reasonable doubt that it was obtained fraudulently. Those sending goods or money by a common carrier, such as an express or a railway company, receive a receipt when the goods or money are delivered to the carrier or warehouseman. Freight shipments are covered by bills of lading, and the contract of the company under which the shipment is made is usually printed on the same.

RECEIVER (rê-sêv'ěr), a disinterested person appointed by a court to receive and disburse the issues or profits arising from property which is in question between the parties through litigation, or which belongs to an infant, or some other person who is not legally competent. The purposes of appointing a receiver are to collect rent or profits, to take charge of and preserve the property from waste or deterioration, and to make final disposition of the goods or property as the court may direct. In some cases such an appointment is made so the business may be conducted, or to prevent the removal of the property beyond the jurisdiction of the court. Since the receiver is an officer of the court and is required to give a bond for the faithful discharge of his duties, he is subject to the law and the judicial decree of the tribunal appointing him.

RECHABITE (rē'kăb-īt), the descendants of Rechab, the ancestor of Jehonadab. These people came to Palestine with the Israelites. They resided in Judah in the time of Jeremiah and, when Nebuchadnezzar invaded Palestine, they took refuge in Jerusalem (Jer. xxxv.). The Rechabites dwelt in tents and abstained totally from the use of intoxicating drinks. A large secret society of total-abstinence men and women, with numerous branches in Great Britain and United States, is known as the Independent Order of Rechabites.

RECIFE (râ-sē'fâ). See **Pernambuco**.

RECIPROCITY (rēs-ī-prōs'ī-tỹ), the exchange of commodities between two subjects of different governments without levying import or export duties on the same. It implies trade relations between two or more nations mutually advantageous to the same extent, and is brought about by means of treaties. Reciprocity first began to be advocated as a definite tariff policy in the United States in the period from 1880 to 1890 as a result of a tariff revision in 1883, which proved unsatisfactory to a class of manufacturers who wanted larger foreign markets for their products. President Arthur sent a commission to visit the countries of South America, in 1884, with the view that the question of reciprocity with their governments might be discussed and more favorable trade relations established. This commission reported in favor of tariff reduction on sugar and wool, but as it had not been authorized to promise concessions the effort resulted practically in a failure to secure any revision.

In 1889 the Pan-American congress met at Washington, and, although it favored reciprocity, the result of the conference was not promising, since the delegates differed more or less regarding the extent of reductions that should be made on the more important articles. Besides, a feeling sprung up that reciprocity does not differ materially from tariff revision on the one hand and from that of tariff reduction on the other. However, sentiment in favor of closer trade relations with South American countries has grown steadily, and no doubt a plan will be carried into practice in the near future under which American products will find a larger market in the republics of South America, and on the other hand more will be bought of the commodities which are not produced to a sufficient extent in the United States.

Although England has been a free trade country for many years, a considerable number of its statesmen under the leadership of Chamberlain favor an imperial custom tariff or reciprocity. This idea was proposed early in 1903 and discussion conducted through 1904 and 1905. The movement is calculated to bring about closer trade relations between the colonies and the mother country, through the medium of lowering colonial tariffs to English ports in exchange for retaliatory tariffs against foreign

products competing with those of the colonies. Reciprocity is represented in Europe at present by a large number of commercial treaties, affecting particularly other nations, and as a general rule the trade between colonies and mother countries is free or less restricted than trade generally. The movement in England is calculated to bring about larger trade relations as well as to confine the trade to channels which will contribute to the permanent welfare of England and its colonial possessions.

RECITATIVE (rēs-ī-tā-tēv'), the name of a kind of vocal composition adapted to musical notes, forming a medium between ordinary recitation or speaking, which it nearly resembles, and measured air or song. It was introduced at Rome in 1600 by Emilio del Cavaliere, who employed it to express action or passion in operas and oratorios. This style is now used in cantatas and oratorios. It may be delivered by the singer according to his fancy, subject of course to the laws of prosody. The chords are struck by the pianoforte to indicate the harmony, but sometimes the organ and other instruments are used. When the recitation is interrupted by interjected passages performed by the orchestra, it is said to be *obbligato*.

RECONSTRUCTION (rē-kōn-strūk'shūn), the term applied to the process of bringing back to the Union the states that seceded previous to or at the beginning of the Civil War in America. The Confederate States passed under the military control of the United States when the Confederate army surrendered in 1865, but the states of this federation were regarded as conquered territories and not as members of the Union. President Johnson held the view that these states maintained the same constitutional relation to the United States government as before their secession, and accordingly appointed provisional governors. These governors invited the people to send delegates to conventions with a view of forming constitutions for the respective states. However, Congress upheld the view that these states could be readmitted only on such terms as that body would impose. This view was maintained principally because it was thought that the freedmen would not secure proper recognition of their civil and political rights, if the matter of reconstruction were left entirely to the southern people, many of whom expressed views in opposition to general enfranchisement.

President Johnson had recognized provisional governments in all the southern states before Congress met in December, 1865, on their accepting the Thirteenth Amendment to the Constitution. Congress proposed the Fourteenth Amendment to the Constitution and in 1867 passed the Reconstruction Act, by which five military districts were established in the South. It was the purpose to effect a registration of voters, including Negroes, and these voters were to elect representatives to a convention, which

should make a constitution and submit it to be ratified by the people. It was next to be submitted to Congress for approval, and, whenever the Fourteenth Amendment was ratified by the Legislature, the states ratifying should be re-instated.

From this act resulted the *carpetbag government*, so called because many designing individuals from the North went to the South to fill offices at favorable remuneration. Under this unsatisfactory condition the leading white men of the South were excluded from participation in the active affairs of the government, the debts of the states affected were increased without receiving value, and the local offices were mismanaged. Many white men, as a means of having satisfactory local government, now organized secret societies, such as the Ku Klux Klan, to prevent the Negroes from voting or holding public offices. Tennessee ratified the Fourteenth Amendment and was readmitted in 1866, hence was not materially affected, but Alabama, Arkansas, Florida, Louisiana, North Carolina, and South Carolina were readmitted under this special act in 1868. It was also required that the amendment be ratified by Georgia, Mississippi, Tennessee, and Virginia, which states were readmitted in 1870. Two years later, in 1872, Congress passed the amnesty act, which removed the disqualification of the ex-Confederates. The reconstruction period ended in the administration of President Hayes, who withdrew from the South the army of Federal troops.

RECORD (rĕk'ĕrd), a written memorial or account of a fact or event of public interest, made by a public official and preserved as a matter for future reference. Records may be public or private, but the latter do not come within the provisions of the law. Public records may be classed as *judicial*, *legislative*, or *miscellaneous*, the latter term embracing all official records that are neither judicial nor legislative. Both the books and the original papers pertaining to a cause at law are judicial records. Any one desiring a certified copy of a public record may obtain it on demand by paying the legal fee therefor.

RED, one of the three primary colors, seen at the end of the spectrum, owing to the fact that its rays are at least broken or refrangible. Red pigments or coloring matters are obtained from the mineral, animal, and vegetable kingdoms. Vermilion and the red ochers are obtained from the mineral, carmine and scarlet from the animal, and madder pigments from the vegetable world. Red is one of the colors adopted by many nations and is the color of the flag used by the anarchists.

RED BANK, a town of New Jersey, in Monmouth County, 25 miles south of New York City. It is on the Shrewsbury River, which furnishes transportation facilities, and on the Pennsylvania and the Central of New Jersey rail-

ways. Many business men of Jersey City and New York reside here. It is visited during the summer by tourists, having many fine hotels and other attractions. Among the features are the high school, the public library, and the Red Bank Shrewsbury Academy. Clothing, carriages, steam boilers, and machinery are among the manufactures. It was settled in 1650 and incorporated in 1872. Population, 1920, 9,251.

REDBREAST. See **Robin**.

RED CLOUD, the popular name of Maqpeya-luta, a chief of the Ogalala Sioux Indians. He was born in Nebraska in 1825 and became noted at an early age for bravery upon the war-path and wisdom in council. In 1863 he fought against the government and remained hostile for five years. He joined Sitting Bull in opposing the sale of the Black Hills and the surrender of their possessions in South Dakota and Wyoming. In 1890 he joined in celebrating the ghost dance. He was a delegate to Washington, D. C., several times. He died Dec. 10, 1909.

RED CROSS SOCIETY, an international society for the relief of the sick and wounded in the time of war, now recognized as an important factor in military sanitation. It may be said to have originated from the recommendations made by Henri Dunant, a Swiss gentleman, who, in 1859, served on the medical force in the Italian wars. At the close of the war he published a work calling attention to the needless hardships endured by the sick and wounded. He recommended that a universal society for the care of disabled soldiers be organized, and that the sick and wounded be regarded as neutrals in the time of war. Soon after he secured aid and coöperation from the Swiss federal council in calling an international conference, which met in Geneva on Oct. 26, 1863, in which sixteen of the leading nations were represented, but since then the number of powers signing the conditions required has increased very materially.

The principal conditions to be complied with by each nation joining the association is the provision that a society is to be maintained by each power, which is to care for the sick and wounded in the time of war, and to devote attention to the training of nurses and preparation of hospital stores in the intervening time of peace. Provisions were made whereby the general society is bound to coöperate by sending representatives and nurses to any country where war, famine, pestilence, floods, or any other great calamity may exist, though the Geneva treaty extends protection only in the time of war. The first provisions for supplying aid in naval warfare were adopted at Paris in 1868, and later other features were added at an international conference held at Berlin. The badge of the society is a red cross on a white background, and it must be accompanied in time of service by the banner of the country in which the society operates. Queen Victoria

issued an order to institute the Royal Red Cross in 1883, which adopted a red Maltese cross as the decoration, bearing the words, *Faith, Hope and Charity*. The American society was formed under the direction of Clara Barton. This society raised \$100,000,000 in 1917, and subsequently other large sums were raised for war relief.

REDFIELD, William Cox, public man, born at Albany, N. Y., in 1858. He became a manufacturer of engines and heating apparatus, and in 1902 was chosen commissioner of public works in the Borough of Brooklyn. In 1910 he was elected to Congress, where he served efficiently on important committees. He became Secretary of Commerce in the Cabinet of President Wilson in 1913.

REDFISH, the name of several fishes, found chiefly off the southern coast of the United States and in the waters off the coast of California and Lower California. One of the species is the familiar *red drum*, or *channel bass*, which has a grayish red color and is from three to five feet long. It is caught in the Gulf of Mexico as a food fish. A species frequently called *flathead* is abundant in California.

REDGRAVE (rēd'grāv), **Richard**, painter, born in London, England, April 30, 1804; died Dec. 14, 1888. His paintings include "Country Cousins," "Hidden Among the Hills," and "Gulliver of the Farmer's Table."

RED JACKET, an Indian chief of the Senecas, born near Lake Seneca, New York, in 1752; died on the Seneca reservation near Buffalo, Jan. 30, 1830. His Indian name was Sago-yewatha, meaning "He keeps them awake," but he was named Red Jacket from a scarlet jacket presented to him early in the Revolution by a British officer. He fought with the Six Nations against the colonists during the Revolution, but helped the Americans against Tecumseh in 1809-10, and fought against the British in the War of 1812. He lost his position as chief for a time after retiring to the reservation on account of intemperate habits, but was afterward reinstated. Red Jacket was sagacious as a statesman and eloquent as an orator, but persistently opposed the establishment of Christian missions and schools. He was the last chief of his tribe, hence is sometimes called *the last of the Senecas*.

REDLANDS, a city in San Bernardino County, Cal., 68 miles east of Los Angeles, on the Southern Pacific and the Santa Fé railroads. It is in one of the greatest orange producing sections of the world and has a large shipping trade in fruit, wheat, barley, and building stone. The chief buildings include the high school, Smiley public library, Y. M. C. A., and many churches. It was settled in 1881 and incorporated in 1888. Population, 1920, 9,571.

RED MEN, Improved Order of, a fraternal and beneficial society which succeeded from the Sons of Liberty, one of the organizations to promote the Revolution in America. It was

reorganized at Baltimore, Md., in 1835, since which time it has increased greatly in membership. Three degrees are conferred, those of Adoption, Warrior, and Chief. The officers are named in reference to certain officials among the Indians, such as prophet, sachem, senior sagamore, junior sagamore, chief of records, and keeper of wampum. In 1916 the order had a membership of about 450,000. In addition it maintains the Degree of Pocahontas, which has a membership of 62,500. The motto is Freedom, Friendship and Charity.

REDMOND, John Edward, statesman, born in Dublin, Ireland, in 1856; died March 6, 1918. He studied at Trinity College, Dublin, was admitted to the bar and became a member of Parliament, representing New Rose until 1885, when he was elected for North Wexford. In 1900 he became the leader of the Nationalist party, in which he continued active for Home Rule until his death. He declined the honor of holding a position in the coalition cabinet of 1915.

RED RIVER, an important western tributary of the Mississippi, the most southerly affluent of that river. It rises in the Staked Plain in Texas, near the boundary of New Mexico. It receives the water from the Negro, Washita, and Little Washita rivers. Owing to its winding course, the Red River has a length of 1,550 miles, of which about 1,200 miles are navigable. It was so named from the color of the sediments carried by it in a period of high water.

RED RIVER, or **Song-Koi**, a river of French Indo-China, in Tongking, rising in the highlands of southern China. After a course of 650 miles toward the southeast, it discharges through a delta into the Gulf of Tongking. In its course are several rapids. On its banks is the city of Hanoi, the capital of Tongking.

RED RIVER OF THE NORTH, a river of the United States and Canada, forming the principal part of the boundary between Minnesota and North Dakota. The Otter Tail rises in the lake region of western Minnesota, near the source of the Mississippi, and has a general course toward the southwest until it makes a bold curve near the border of the State and then joins the Bois de Sioux to form the Red River of the North, which flows nearly due north into Lake Winnipeg. Among its numerous tributaries in the United States are the Goose, Sheyenne, Wild Rice, Marsh, and Red Lake rivers. Its total length is 660 miles, of which 520 miles are in the United States. The Assiniboin joins it in Manitoba, at the city of Winnipeg. The Earl of Selkirk made the famous Red River settlement, on the banks of the Red River of the North, in 1812. It was founded on a tract of land obtained from the Hudson Bay Company, which was afterward conveyed back to that company, and in 1870 was transferred to Canada. It is now a part of the Province of Manitoba.

RED SEA, or **Arabian Gulf**, an inlet from

the Indian Ocean, lying between Africa and Arabia. It communicates with the Gulf of Aden by the Strait of Bab-el-Mandeb, and stretches in a narrow expanse of water toward the northwest to the Isthmus of Suez, which separates it from the Mediterranean. Its length is 1,450 miles and its width in the central part is about 200 miles, whence it gradually diminishes toward the extremities, being about 20 miles wide near the Strait of Bab-el-Mandeb. It is divided in the upper part by the Sinai peninsula, thus forming the two gulfs of Suez and Akabah. The former is the larger of the two, being 180 miles long and 25 miles wide, while the latter is 100 miles long and about 12 miles wide. The Red Sea has been an important seat of commerce from remote antiquity and was navigated by the ancient Egyptians, Phoenicians, Arabs, Hebrews, and Persians.

Navigation of the Red Sea is more or less dangerous, owing to the prevalence of violent winds and the numerous shoals, islands, and coral reefs that abound along the shores. Coral reefs are particularly abundant near the Arabian coast, where they are remarkable for their scarlet tints mingled with white. A strong current of wind blows from the south from October to May, and from the north from May to October. This results in a current of water passing through the Strait of Bab-el-Mandeb in the former season, which raises the sea level several feet, but it is correspondingly lowered in the period in which the wind blows from the north. Much of the trade from Southern Asia passed up the Red Sea and was conveyed by caravans to the Mediterranean until the route around the Cape of Good Hope was discovered, when it was turned largely in that direction, but in 1870 the Suez Canal was opened to trade, which immediately reestablished the Red Sea as an important highway between the Orient and the Occident. Considerable trade is carried across the sea, but this consists chiefly of local products and the traffic in connection with pilgrims to Mecca. Jedda, Hodeida, and Mocha are the principal seaports on the Arabian coast and Kosseir, Massowa, Suez, and Suakim on the African coast.

REDSTART, a genus of American birds, which are native to a region extending from Canada to Bolivia. About a dozen species have been described. They are very active, being skilled in catching flies and other insects while on the wing. The male of most species has a glossy black color, with spots of white and orange red on the wings and tail, and the female is brownish. The *common redstart* of the Old World is somewhat larger and resembles the redbreast. It has a melodious song and may be domesticated. Redstarts are migratory.

REDTOP, the name of several species of grass grown extensively for hay and pasturage. It is sown in most localities with timothy and

clover and thrives best in soils that are too moist for the growth of other cultivated grasses. All the species are valuable because they maintain themselves against the growth of weeds and other grasses of less value. Some species are small and are sown to decorate lawns and parks.

RED WING, a city in Minnesota, county seat of Goodhue County, on the Mississippi River, forty miles southeast of Saint Paul. It is on the Chicago Great Western, the Chicago and Northwestern, and the Chicago, Milwaukee and Saint Paul railroads. The noteworthy buildings include the county courthouse, the high school, the public library, the Lutheran Ladies' Seminary, and the Lutheran Theological Seminary. It has well-graded streets, systems of sewerage and waterworks, and a well-graded system of public schools. Among the manufactures are boots and shoes, furniture, lumber products, machinery, stoneware, flour, and earthenware. The surrounding country is agricultural and dairying. It was settled in 1853 and incorporated as a city in 1864. Population, 1905, 8,149; in 1920, 8,637.

REDWOOD, a species of sequoia, native to the Pacific coast of North America, but found chiefly in Oregon and California. It is one of the largest trees in existence, attaining a diameter of 12 to 15 feet and a height of 225 to 300 feet. The name redwood is applied because the newly cut wood has a reddish color, but it soon fades on exposure to light and the air. The grain of the wood is straight, is well fitted for inside finishing of buildings, and takes a good polish. The forests are maintained by seeds and suckers sent up from the stumps. See **Sequoia**.

REED, in music, the mouthpiece of the bassoon, hautboy, clarinet, and several other instruments. Reeds were first made of cane, whence the name has been extended to the reeds of the organ and the harmonium. They are now made of a thin strip of metal. The reed itself does not produce the sound, but is only the means of obtaining the sound from the current of air directed against it. Two classes of reeds are in general use, the striking and the free. The *striking reed* is commonly used in the pipes of an organ and requires to be placed in a tube as a means to produce a musical sound. The *free reed*, such as is used in the harmonium, has a smoother and more mellow sound than the striking reed and does not require a pipe, as does the latter.

REED, Thomas Brackett, statesman, born in Portland, Me., Oct. 18, 1839; died Dec. 6, 1902. He graduated from Bowdoin College in 1860, studied law, and in 1864 entered the navy as assistant paymaster. In 1865 he began the practice of law at Portland and in 1868 became a member of the Maine Legislature. He was attorney-general of the State for two years, was city solicitor of Portland for four years, and in

1876 was elected as a Republican to Congress, where he served continuously until retiring from political life on April 20, 1899. Reed became



THOMAS B. REED.

a leader of his party on the floor of the House soon after entering Congress, owing to his efficiency as a speaker and parliamentarian, and served as speaker of the House in the 51st, 54th, and 55th congresses. He was vigorous as a presiding officer, though many public men at first

criticized his rulings as arbitrary, but in viewing his positions in the light of history they may be said to have resulted in better and more efficient legislation. His resignation was due to the fact that he regarded it in line with his duty to his family to secure a larger income than is shared by persons holding public office, and he was succeeded as speaker by David B. Henderson of Iowa. It may be said that Reed is considered by all parties one of the most able statesmen of America. He did not favor the so-called expansion policy supported by the administration of William McKinley, sharing in this the view of Benjamin Harrison. He is the author of Reed's "Rules of Parliamentary Law" and contributed many articles to magazines and encyclopaedias.

REEVES (rēvz), **John Sims**, eminent tenor singer, born near London, England, Oct. 21, 1822; died Oct. 25, 1900. His father resided at Shooter's Hill, where the youth received his early training in music, and at fourteen years became organist of North Gray Church. Later he learned to play on various instruments, appearing often as an orchestral leader, and in 1839 sang as a baritone at Newcastle Theater. In 1841 he joined a company at Drury Lane under Macready, but soon after took musical training at Paris and Milan, and in 1847 appeared at Drury Lane, where he attained high distinction. He is noted particularly because of his high quality of oratorio and ballad singing and long ranked among the first tenor singers. He gave up concert singing in 1891, and the following year was elected professor of the London Guildham School of Music.

REFERENDUM (rĕf-ēr-ĕn'dŭm), the name used to designate the practice of submitting to a vote of the people for approval or rejection the laws passed by their representatives in a legislative capacity. Such laws are first passed by the legislature and properly certified, and they are then submitted at the next regular election for consideration by the electorate. In some countries the referendum is *optional*,

while in others it is *obligatory*, that is, the laws must be submitted without petition. The *initiative* is the logical complement of the referendum, since it enables the people to draw up their own laws, which are then submitted to the legislature, or they may be proposed by petition and submitted without any action on the part of the legislative branch. Both the initiative and the referendum are in use in some form in all the cantons of Switzerland, except Freiburg. Both are in vogue as a feature of the government of the Swiss Confederation, and under a provision of the constitution it is obligatory to submit any law on demand of eight cantons, or a petition signed by 30,000 citizens. The referendum was adopted in Switzerland in 1874 and the initiative was made a feature of the government in 1891. In Canada and the United States the referendum is employed to a considerable extent, especially in matters of municipal government, such as permitting the sale of intoxicating liquors, granting franchises to electric railway and other corporations, and issuing or refunding town and city bonds.

REFLECTION (rē-flĕk'shŭn), the power that the mind has to consider and compare sensations and ideas by the aid of the principles of association. It is one of the primary sources of all ideas, the other source being *sensation*. Some writers, as Herbart, discuss analysis and synthesis as integral parts of reflection. See **Psychology**.

REFLEX ACTION, the name applied to any action performed involuntarily in consequence of an impulse transmitted along certain nerves to a nerve center, whence it is reflected to an efferent nerve, hence inducing action in certain muscles, organs, or cells. Reflex action has its seat chiefly in the brain and spinal cord. The majority of these phenomena are very complicated, varying greatly in the intensity and rapidity, as in a series of coughs to remove dust from the air passages. Extensive research has shown that the impulses from the receiving surface toward the interior and from the central cells outward are transmitted with equal facility, that the rate of motion is much slower than that of electricity, and that only a small amount of energy is extended in the transit. Natural electric currents pass over the fiber, but no chemical or physical changes in the fibers resulting from the passage from impulses have been detected. Waste of tissue and weariness accompany the expenditure of energy, but the exact volume of waste cannot be determined.

REFORMATION (rĕf-ōr-mā'shŭn), the great religious revolution of the 16th century, which may be said to mark the end of the Middle Ages and the establishment of Protestantism. Western Europe was under the absolute authority of the Roman popes from the year 800, when Pope Leo III. crowned Charlemagne emperor of the Romans, until restricted by the results following the Reformation. In

this period of about 800 years papal authority was supreme over all the Christian Church, except only the countries where the Greek Church had secured a foothold, and this authority was exercised both in spiritual and temporal affairs. Various abuses arose from this widespread power, against which many devoted members of the Roman Church protested and from which both laymen and clergymen sought to secure relief.

Many causes may be assigned as the incentives that induced the people to rise in this mighty religious revolution, some of which extended back to the early introduction of the Papacy. Although many efforts had been made to revise the doctrines and ceremonies of the church, such as confession to a priest, the invocation of the saints, and the devotion to the Virgin Mary, the first organized movement did not occur until the early part of the 15th century. It was led by John Huss and Jerome of Prague, in Bohemia, but they and their followers were not able to wield a widespread influence, since conditions had not formed that contained the necessary elements to crown such a movement with success. Among the events that formed and molded public opinion favorable to a great reformation were the invention and general use of printing, the diffusion of knowledge through universities teaching the Greek and Hebrew languages, and advancement in industrial arts and commerce, all tending to lead the people to assert their independence of thought and energy. Besides, the rise of modern literature occasioned by the Renaissance brought forward such writers as Erasmus, who held the abuses of power up before thoughtful men. The last spark needed to kindle a widespread revolution of thought was furnished in the pontificate of Leo X., when Johann Tetzel, a Dominican monk of Leipsic, published indulgences in Germany, to procure means for the building of Saint Peter's at Rome.

The appearance of Tetzel in Saxony was followed immediately by the pronounced opposition of Martin Luther, an Augustine monk and professor of theology in the University of Wittenberg, who, on Oct. 31, 1517, posted 95 theses or questions on the door of the church. His able sermons won many adherents among the influential nobles and princes, who united with him in urging the Pope to suppress the traffic in indulgences and otherwise reform various practices. This brought him into conflict with Pope Leo X., who excommunicated him in 1520, but Luther appealed to a general council. However, his works were burned at Cologne, Mentz, and Louvain, and he retaliated by publicly burning the papal canons and decrees. When Luther formally separated from the Roman Church, he was followed by many German nobles, while most of the eminent scholars, and particularly the University of Wittenberg, declared in favor of the reformed faith. In 1521 he was summoned before the Diet of

Worms by Emperor Charles V. of Germany, and his bold refusal to recant not only increased the reform movement, but made it a political matter in the North German States. Soon after the Bible was translated and published in the German language, Luther's "Liturgy" appeared in 1522 and was immediately adopted by Magdeburg and other cities, and translations of the Bible into the Dutch and French languages soon followed. The reformed faith received legal recognition for the first time by the Peace of Augsburg in 1555, which gave each prince liberty to adopt either the Protestant or Roman Catholic faith.

Protestantism was carried to Sweden under Gustavus Vasa, who became king in 1523, and it was formally adopted in the Danish dominions at a diet held in 1536. Lutheranism found many adherents in Hungary and Poland, but it was kept out of Italy and Spain by the vigorous application of the Inquisition. Zwingli and Calvin carried Protestantism into Switzerland and various parts of France, while John Knox embraced that faith in 1543 and gave it a firm foothold in Scotland. The first separation from the Roman Church occurred in England under Henry VIII., in 1527-47, but the movement was made more spiritual by improvement in the translations of the Bible and the adoption of the articles or confessions in the period between 1547 and 1573, and Protestantism became finally established under Queen Elizabeth. It may be said that the view taken by Lord Macaulay in regard to the Reformation is the correct one, since he looked upon the movement as consisting of two distinct phases, one applying to a reformation of the doctrine in the northern part of Europe, and the other in reforming the doctrine and discipline of the church in the Latin and Spanish countries. The intellectual impulse communicated by the Reformation is still in force and will never cease to exist. See **Gustavus II.; Luther, Martin; Thirty Years' War.**

REFORMED CHURCH, the name given first to the Helvetic Church, which rejected certain doctrines of Luther concerning the sacrament of communion, regarding it simply a commemorative ordinance. The term is used in history to comprehend all those churches that were organized as a result of the Reformation, but it is applied specially to several branches resulting from dissensions arising at conferences, such as the Reformed Presbyterians and the Reformed Episcopalians. The Reformed Church of the United States is a German body organized in Pennsylvania by settlers from Germany, about 1684. It now has 1,685 churches and 250,000 communicants, and maintains a number of missions and institutions of higher learning. The most important institutions include Franklin and Marshall College, Lancaster, Pa.; Heidelberg University, Tiffin, Ohio; Palatine College, Myerstown, Pa.; and Catawba

College, Newton, N. C. The Reformed Church of America is a Dutch organization and was established in the United States in 1628 by members of the Reformed Church of Holland, who settled at New Amsterdam, now New York. It has 625 churches, 125,000 communicants, eight institutions of higher learning, and a number of missions. The principal colleges are at Holland, Mich.; New Brunswick, N. J.; and German Valley, Ill.

REFORM SCHOOL, an institution maintained to train juveniles who have been convicted of crime. Schools of this kind are now more generally termed *industrial schools*, since they teach various industries in connection with the common branches of study, and this name has been adopted at least in part because it is less objectionable to those who are completely reformed after systematic training. Usually these institutions are located on a large tract of land, frequently from 100 to 300 acres, and the industries include gardening, fruit growing, stock raising and general farming. Those confined usually receive instruction half of the time, and the remainder of the day is devoted to work in the yards or fields. These schools generally have laundries, bakeries, and various shops, the purpose being that all of the repairing as well as the domestic service is to be done by the inmates. Juveniles are thus separated from the older and hardened criminals, and are educated in the fundamentals as well as the domestic and industrial arts. The first institution of this kind in America was established by an act of the Legislature of New York, in 1824, under the name of the New York House of Refuge. They are very numerous at present. Practical experience has demonstrated their utility in training and reforming.

REFRACTION (rê-frăk'shŭn), the change in the direction of all kinds of wave motion, as in light and heat, when the waves enter obliquely a medium of a different density from that through which it previously moved. In astronomy the term is applied to the change in the direction of a ray of light resulting from its passage through the atmosphere of the earth, and, consequently, to the change in the apparent position of a heavenly body from which the light emanates. Refraction has the effect of causing the heavenly bodies to appear higher in the sky than their real position, but it is greatest at the horizon, where it is about 38'. It decreases uniformly toward the zenith. Refraction has the effect of causing the heavenly bodies to appear to rise earlier and set later than they actually do, hence we see the sun in the morning while the entire disc is yet below the horizon. For the same reason, we see it in the evening a short time after it has passed the horizon. A familiar illustration of the refraction of light may be seen by immersing a stick partly in a glass of water, when the refraction of light will cause it to appear bent where it

enters the water. It is due to refraction that the visible part of the sun during a partial eclipse appears relatively larger than the portion covered by the disc of the moon. Twilight, the gradual change from daylight to darkness, is the effect of the successive refractions of the light by the successive layers of the atmosphere.

REFRIGERATION (rê-frīj-ēr-ă'shŭn), the art of employing artificial means to reduce the temperature. It was practiced in very ancient times, but improved apparatus and systems to promote commercial refrigeration on a commercial scale are comparatively recent. The process depends upon the law of physics that any substance passing from a liquid to a gaseous state absorbs a certain amount of heat and, on the other hand, it gives off the same amount of heat when returning from a gaseous to a liquid state. As a means of promoting refrigeration a number of agencies may be employed, such as compression, condensation, absorption, liquefaction, and the vacuum process.

In ordinary household economy it is customary to use a common ice *refrigerator*, which consists of a chamber or box holding a supply of ice to cool provisions and keep them from spoiling in warm weather. Most refrigerators have two compartments, in the upper of which ice is stored to supply cooled air to come in contact with the provisions in the lower compartment, whereby they may be kept near the freezing point. Refrigerators used for household purposes are on this plan and have a device to carry off the water that results from the ice melting. Those used in meat markets are much larger than the devices employed for household purposes, but the same principles are utilized in them and in refrigerator railroad cars. The latter are employed in transporting meat, fruit, and other perishable commodities. See **Ice**.

REGELATION (rê-jê-lă'shŭn), the name applied to the freezing together of contiguous surfaces without the application of outward cold, as in the case of two large blocks of ice. This phenomenon is common to all substances which increase in volume upon freezing. When two pieces of ice are brought in close contact and submitted to pressure, the surfaces melt, and the two pieces are united by freezing when the pressure is relieved. Faraday discovered this phenomenon in 1850, and Lord Kelvin demonstrated that snow in the tracks of wheels is covered with a thin film of ice, owing to the fact that pressure of the vehicles causes it to melt and that it freezes as soon as the pressure is removed. According to this theory, a snowball is solidified not by compressing a given quantity of snow into a smaller body, but by small particles melting under pressure and then solidifying by regelation. The movement of glaciers is greatly modified by this phenomenon.

REGENERATION (rê-jên-ēr-ă'shŭn), the

Christian doctrine formally expounded by Jesus in his interview with Nicodemus, which is generally held to be a radical and permanent change wrought in the spiritual nature of man by the Holy Spirit through faith in Christ. Regeneration is regarded by some churches as the beginning of the new life conferred in baptism, which is called the *sacrament of regeneration*, while others look upon it as a change in the governing purpose, or as the creation and continuation by the Holy Spirit of a new series of holy acts.

REGENSBURG (rā'gěns-bōōrg), or **Ratisbon**, a city of Germany, capital of the Bavarian province of Upper Palatinate, on the Danube, 65 miles northeast of Munich. It is important as a commercial and railroad center, is strongly fortified, and has many interesting monuments dating from the Middle Ages. The streets are broad and well improved, having pavements of stone and asphalt, electric and gas lights, rapid transit, and numerous squares and parks. Among the noteworthy buildings are the Church of Saint James, a Byzantine structure of the 12th century, the townhall, and the Royal Library, containing 75,000 volumes. It has a splendid monument in honor of Kepler, the astronomer, who resided and died in Regensburg. The manufactures include beet-root sugar, jewelry, paper, metalware, pottery, soap, scientific instruments, and machinery. The city is one of the most ancient of Germany, having been founded by the Celts under the name of *Radasbona*. In the time of the Romans it was fortified and named *Castra Regina*. Since 1810 it has belonged to Bavaria. Population, 1905, 48,801; in 1920, 52,540.

REGENT (rē'jěnt), the name applied to a ruler who governs a monarchy during the minority, absence or disability of the sovereign. The duties of this office usually devolve upon the nearest relative of the sovereign who is capable of undertaking them, especially in hereditary monarchies. The term is applied in the State of New York to a body of commissioners in whom is vested the superintendence of public instruction, and in many states to the presiding officer of the university. The term is used similarly in various countries in Europe, particularly to designate a member of one of the universities of England.

REGILLUS (rě-jī'lūs), a lake mentioned in the history of ancient Rome, situated southeast of the capital, in the crater of the extinct volcano Cornufelle. It is celebrated in legendry as the scene of an important battle in 496 B. C., between the Romans and Latins, in which the former attained a signal victory. The lake was drained in the 17th century.

REGIMENT (rěj'i-měnt), a body of regular troops, whether infantry, cavalry, or artillery. This division of a military organization consists of from two to four battalions, differing somewhat in various countries, and numbers

about 1,000 men. It is the largest permanent association of soldiers, the third subdivision of an army, several regiments constituting a *brigade* and several brigades a *division*. The regiment is commanded by a colonel, one or more lieutenant colonels, and several majors, according to the battalions into which it is divided. Subdivisions of the battalions are known as companies, each of which is commanded by a captain and one or more lieutenants. The regiment originated in France about 1560 and is now a subdivision of the troops in nearly all civilized countries.

REGINA (rě-jī'nà), the capital of Saskatchewan, in a flourishing agricultural and stock-raising section, on the Canadian Pacific and the Canadian Northern railways. It is the headquarters for the Northwest Mounted Police. The principal buildings include those of the government, the high school, the public library, the King's and the Wascana hotels, and several fine churches and business houses. It has large grain elevators, flouring mills, machine shops, pressed brick factories, iron foundries, and a growing commercial trade. Large quantities of wheat and live stock are shipped to points both east and west. The waterworks and electric power plant are owned by the municipality. Population, 1901, 2,249; in 1922, 34,432.

REGNAULT (rě-nyō'), **Alexandre Georges Henri**, eminent painter, born in Paris, France, Oct. 31, 1843; fell in battle Jan. 19, 1871. He was a son of Henri Victor Regnault (1810-1878), a French chemist and physicist, and studied art in Paris and Rome. After remaining in Rome two years, he went to Spain in 1869 to paint landscapes and views in relation to Moorish architecture and life. In 1870 he returned to France, where he entered the army as an enthusiastic supporter of the imperial government in the Franco-Prussian War, and was slain on the battlefield of Buzenval. His most famous painting is "Execution Without Judgment under the Moorish Kings of Granada." A monument in Paris commemorates him.

RÉGNIER (rě-nyā'), **Henri de**, poet, born in Honfleur, France, in 1864. He studied at the Collège Stanislas, Paris, and published his first volume of poems in 1887. His productions are numerous and of a classical nature. In 1900 he was awarded the Vitet prize by the France Academy, and in the same year directed a series of lectures to the French Cercle Français. Among his writings are "Sites," "Episodes," "Le trèfle blanc," "Le corbeille des heures," "La double maîtresse," and the essay entitled "Mallarmé," first published in the *Revue de Paris*.

REGULUS (rěg'ū-lūs), **Marcus Attilius**, Roman consul and general. Little is known of his early life, but it is certain that he was first elected to the consulship in 267 B. C., and that he received the honor of a triumph for his military successes soon after. He was made

consul a second time in 256 B. C., and soon after headed a navy of 330 ships against the Carthaginians in the First Punic War. An engagement occurred off Heraclea Minor, in which the Romans were successful, and shortly after Regulus established a station near Clypea. He was victorious in a number of encounters, but in 225 B. C. the Spartan Xanthippus commanded the forces of Carthage and not only defeated the Romans, but made Regulus a captive. On the arrival of reinforcements from Rome, Regulus was sent to the capital on parole to urge a treaty of peace, but when he reached Rome he urged the senate to refuse conditions of peace or the exchange of prisoners. On returning to captivity he was put to torture and died from the effect.

REHAN (rē'an), **Ada**, actress, born in Limerick, Ireland, April 22, 1860; died Jan. 1, 1916. She came to America in 1866, and, after attending school, fitted herself for the stage. From 1873 to 1875 she filled an engagement in Philadelphia and subsequently played successfully in Baltimore, Albany, and New York City. In the last mentioned city she was in the theater of Augustin Daly from 1879 until the death of the proprietor, and subsequently played with much success in France, Germany, and England. Her ability as an actress in farcical plays and high comedies won her a high place among American actors. Her chief rôles were as *Katharine* in "Taming of the Shrew" and as *Rosalind* in "As You Like It." She played successfully as *Peggy* in "The Country Girl," as *Valentine Osprey* in "The Railroad of Love," as *Nancy Brasher* in "Nancy and Company," and as *Maid Marian* in Tennyson's "Foresters."

REICHENBACH (rī'ken-bāk), **Karl, Baron von**, naturalist and technologist, born in Stuttgart, Germany, Feb. 12, 1788; died in Leipzig, Jan. 19, 1869. He was educated at Tübingen, and soon after conceived the project of establishing a German state in the South Sea, which was made an excuse for the French authorities to cause his arrest and confinement in the Hohenasperg fortress. Soon after his release his attention was turned to natural sciences and industrial arts, and in 1821 he established a number of manufacturing enterprises in Moravia. These not only proved highly successful, but were so profitable that he purchased large estates in Württemberg and was created a baron by the king. He continued his scientific investigations and succeeded in discovering paraffin, creosote, and a number of compounds previously unknown. In later life he engaged enthusiastically in the study of animal magnetism, discovering an influence in nature known as the *odylic force*. His most important publications are "Treatise on Geology," "Year Book of Chemistry and Physics," "Sensibility and the Odylic Force," and "Relations of Magnetism and Electricity to the Phenomena of Life."

REICHSTADT (rik'stät), **Napoleon François Joseph Bonaparte**, the name of the only child of Napoleon I. and the Empress Maria Louisa, but called Napoleon II. by the Bonapartists. See **Napoleon II.**

REID (rēd), **Mayne**, soldier and author, born in Ulster, Ireland, in 1818; died in London, Oct. 22, 1883. He was educated for the church, but came to America in 1838 in search of a fortune. Much of his life in the United States was spent in roving adventures, in which he visited many states and studied the habits of Indians and pioneers on the frontiers. In 1845 he joined the American army and served through the Mexican War, attaining the rank of captain and taking part in the battles of Vera Cruz and Chapultepec. He returned to England in 1849 and began the career of a novelist. Reid wrote many interesting narratives of his adventures in the Mexican War and on the American frontiers. His best known writings include "Scalp Hunters," "The Headless Horseman," "The Rifle Rangers," and "The White Chief."

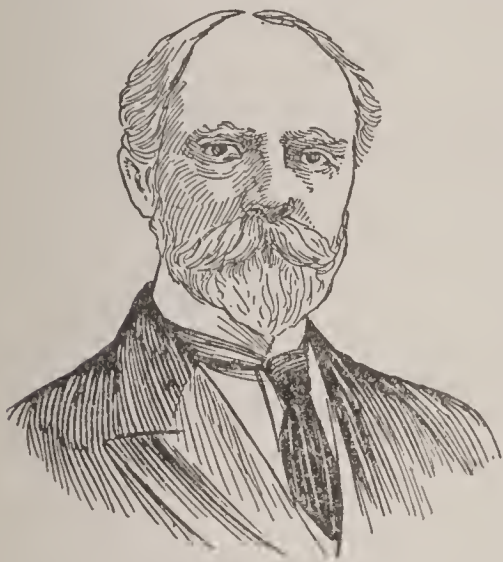
REID, Robert Gillespie, railroad contractor, born at Coupar Angus, Scotland, in 1842; died June 3, 1908. At an early age he went to Australia to engage in gold mining, where he also supervised the construction of bridges and mining property. In 1871 he came to America, thinking that he could better himself by promoting enterprises in Canada. He had charge of the construction of the international bridges across the Niagara River and across the Rio Grande, and in 1893 took a contract with the government of Newfoundland to construct a railway across the island from Saint John's to Port-aux-Basque at the rate of \$15,000 per mile. Subsequently he contracted to operate the railways in the island for a period of fifty years, and received land grants in part payment and for constructing telegraph lines.

A large majority of the people protested against a number of contracts made with Reid for the construction of docks, street railways, and railroads, which finally caused the resignation of Governor James Winter and his cabinet and the election of Liberals to control the government. This brought about a settlement between the government and Mr. Reid, by which it was agreed that the property of the Reid Newfoundland Company was to revert to the government at the end of fifty years on payment of \$1,000,000 and such additional sum as might be awarded by a board of arbitration. The transactions and grants by the government, though instrumental in developing many resources of Newfoundland, stand as examples of recklessly giving public interest over to private corporations. He was knighted in 1907 as a recognition of his service in developing the resources of Newfoundland.

REID, Thomas, philosopher and author, born in Strachan, Scotland, April 26, 1710; died Oct.

7, 1796. He graduated from Aberdeen College in 1726, where he remained as librarian for ten years, spending much of his time in careful study. He was appointed minister of the parish church of New Machar in 1737 and labored incessantly until 1752, when he was elected professor of moral philosophy in King's College, Aberdeen. The professorship of moral philosophy in the University of Glasgow was given to him in 1763. Soon after he published his philosophical work, "Inquiry Into the Human Mind." Reid was a patient, industrious thinker, but not a rhetorician. His style was simple and unadorned, but very clear. Among his writings are "Essay on Quantity," "Philosophy of the Intellectual Powers," and "Essays on the Active Powers."

REID, Whitelaw, journalist, born in Xenia, Ohio, Oct. 27, 1837. He graduated from Miami University in 1856, and soon after took editorial



WHITELAW REID.

charge of the *Xenia News*. At the beginning of the Civil War he became the Washington correspondent of the *Cincinnati Gazette*, in which his articles appeared over the name of *Agate* and attracted general attention. Later he proceeded south with

the army to describe various engagements, thus contributing much of value to war history. He accepted an editorial position on the *New York Tribune* in 1865, then edited by Horace Greeley, and at the death of the latter succeeded to the ownership of that journal. His ability and energy were not only sufficient to maintain the high standard of the paper secured under its former eminent editor, but he made it a political and financial success, taking prominent part in molding public opinion. President Harrison appointed him minister to France in 1889 and in 1892 he became the candidate of the Republican party for Vice President along with Benjamin Harrison, but the ticket failed of election. He represented the United States at the coronation of Edward VII. in 1902, and three years later President Roosevelt made him ambassador to England. Reid was for some time regent of the University of the State of New York, served as president of the Lotus Club of New York City, and is the author of a number of books relating to the war and to political subjects. Among the most noted are "After the War," and "Ohio in the War." He died Dec. 15, 1912.

REIKIAVIK (rā'kyā-vēk), or **Reykjavik**, a city in Iceland, capital of Danish America. It is situated in the southwestern part of the

island, on a large bay, and has a considerable trade in merchandise. The capitol building has a fine library and a museum of Icelandic antiquities. Besides common schools, it has several institutions of higher learning, at which about 150 students attend. Telephones, electric lighting and waterworks are among the facilities. Population, 1918, 6,982.

REINDEER (rān'dēr), a species of mammals of the deer family, native to the northern regions of Europe and Asia. It has long been domesticated in Scandinavia, especially among the Laplanders, and in the northern parts of Asia, but is still found in the wild state in Spitzbergen and other sections of the far north. The reindeer differs from the common deer in being less gracefully formed, in having stouter limbs, and in carrying its head less elevated. The antlers of the male are much larger than those of the female and the upper parts are palmated or branched. A marked difference is noticeable in the size of reindeer, this depending largely upon latitude, the larger species occurring in the regions farthest north. The usual height when full grown is about four and a half feet, the color is brownish-yellow in winter and grayish-white in summer, and the horns are shed every year. The reindeer is valuable because of its flesh, hide, and milk. Large herds are reared in many sections of Northern Eurasia, in Greenland and Iceland, and in several localities of North America. They are used as saddle and pack animals in Kamchatka, but serve chiefly for draught purposes. A single reindeer is capable of moving 200 pounds at the rate of from eight to ten miles per hour and can endure work for a considerable time. The reindeer native to North America is the caribou, which includes several species differing but slightly from those of Europe. *Reindeer moss* is a form of lichen of much importance because of its value as food for the reindeer, but these animals also feed on other forms of vegetation. See illustration on following page.

RELATIONSHIP (rē-lā'shūn-shīp), the relation that exists between two persons on account of marriage or ancestry. The relationship between husband and wife, as well as that of others through marriage, is known as *affinity*, while that due to the descent from the same ancestors is called *consanguinity*. The latter may be either lineal or collateral. By *lineal consanguinity* is meant the direct descent from one to another, as from father to son or grandson, while *collateral consanguinity* refers to those who descended from common ancestors, as the children of two brothers, who are *cousins* in relation to each other. In law, the kindred of the wife by blood are related to the husband by affinity, her brothers and sisters being respectively the *brothers-in-law* and the *sisters-in-law* to the husband. The relationship of children of cousins, popularly called *second*

cousins, is not recognized in the law of most countries. Relationship by affinity and consanguinity bars service as judges or jurors in the trial of causes, and in some countries the marriage of cousins is not permitted.

RELATIVE RANK (rĕl'ă-tĭv), a term used in the army and navy to signify the precedence of officers. The following list indicates the relative rank of combatant army officers and their equivalent in the navy:

ARMY.	NAVY.
General.....	Admiral
Lieutenant General.....	Vice Admiral
Major General.....	Rear Admiral
Brigadier General.....	Commodore
Colonel.....	Captain
Lieutenant Colonel.....	Commander
Major.....	Lieutenant Commander
Captain.....	Lieutenant
First Lieutenant.....	Lieutenant (junior grade)
Second Lieutenant.....	Ensign

RELIGION (rĕ-lĭg'ŭn), the reverent feeling by which men indicate their recognition of the existence of a Supreme Being, to whom they attribute power over their destiny and render obedience, service, and honor. The religious feelings are experienced only in beings that possess advancement in intellectual and moral faculties to a moderately high degree. Religion differs from morality in that it denotes the influence and motives of human duty found in the character and will of God, while morality is concerned with the duties that one individual owes to another, but in their fulfillment true religion is a potent influence. As distinguished from theology, religion is subjective, in that it designates the feelings and acts of men relating to God, while theology is objective, denoting the beliefs and ideas that man entertains in respect to the God whom he worships according to the nature of his views. Darwin considers the feeling of religious devotion to be highly complex, since it includes love, complete submission, dependence, reverence, gratitude, fear, and hope for the future. On the other hand, Max Müller regards religion a mental faculty that enables man to apprehend the Infinite under different names, even without the exercise of reason, and regards it as a mark of broad distinction between man and the lower animals.

The term religion is likewise employed to imply forms of doctrines that have come down to the present time by tradition or in canonical books. When used in this sense, it extends to the different religious forms supported by people in all states of society, from the savage to the highly civilized, though the many different forms may be quite accurately divided into two general classes, the *polytheistic* and *monotheistic*. Those grouped under the former are systems that recognize a plurality of deities, while those belonging to the latter class recognize but one, an ever-existing, unchangeable, almighty God (q. v.). It may be said that all

forms of religion are historically connected and related to each other, and have influenced one another in various ways that can be discovered quite easily by the study of history. Like the history of art, industry, science, and society in general, religion has been a process of development in which each stage has proceeded gradually from antecedent factors and conditions. However, it is not studied entirely from a historical standpoint, but in its unity and entirety, with a view to learn of its essence and all its



REINDEER.

essential relations. In this aspect it comprehends the philosophy of religion, and in an independent form it could not have been studied appropriately until both philosophy and theology were highly developed.

Writers have made various estimates of the different religious creeds supported in the world, but all of them are only approximately correct. The following table is taken from the most recently published reports, which place the entire number of religious worshipers at 1,490,464,202, as follows:

CHRISTIANS.	NON-CHRISTIANS.
Roman Catholics..228,666,533	Confucians.....200,000,000
Protestants.....163,300,000	Hindus.....210,000,000
Orthodox Greek Church.....98,016,000	Mohammedans....250,000,000
Church of Abyssinia.....3,000,000	Buddhists.....147,900,000
Armenians.....2,690,000	Polytheists.....117,681,669
Coptics.....260,000	Taoists.....43,000,000
Nestorians.....80,000	Shintoists.....14,000,000
Jacobites.....70,000	Jews.....11,800,000
Total.....496,082,533	Total.....994,381,669

RELIGIOUS LIBERTY, the freedom of religious opinion, the equality of all churches, or the right of every individual to worship according to the dictates of his own conscience. It is the purpose of civil government to neither support nor hinder any form of religion, but it is charged with the duty of preventing excesses and encroachments upon private rights. While injuries are not to be inflicted on account of religious belief, special privileges are not to be granted to any class of individuals or religious associations. The state is limited to the overt act, while religion takes an account of the attitude of the mind or soul.

Ancient nations had no conception of religious liberty, but instead treated as disloyal those who preferred not to worship at the shrine of the altars set up by a system of state religion. Gradually the public mind became more tolerant, but it again relaxed in the early centuries of the Christian era, when the spread of the religion of Christ was looked upon as an interference with existing governments. Emperor Constantine, after his conversion, established Christianity by law, in 313. This may be looked upon as an unfortunate event in the history of religion, since it was the forerunner of allying religion with civil authorities in many nations, which has not been entirely overcome up to the present time. In the early history of the Roman Catholic Church it subjected governments under its authority, or formed alliances with civil powers. Although the Reformation was not entirely tolerant, it may be said to constitute the forerunner of religious liberty in the world. Freedom of worship is now generally permitted in the nations of the world, but some give aid and support to certain denominations. However, the tendency is toward absolute liberty in regard to freedom of conscience and worship.

REMBRANDT (rĕm'brănt), **Hermensz**



HERMENSZ V. REMBRANDT.

Van Ryn, eminent painter and etcher, born in Leyden, Holland, July 15, 1607; died in Amsterdam, Oct. 8, 1669. He was the son of a miller of the Rhine near Leyden, studied in the Latin school of his native

city, but in 1630 removed to Amsterdam, where he had studied art a number of years before. His numerous etchings and paintings are among

the most excellent of the Netherlands, and he became the master of a number of skilled painters. Many of his productions are still extant, including portraits, landscapes, and genre and historical subjects, and besides these he produced about 375 etchings of merit. The excellent coloring, expression, blending of light and shade, and superior composition of his works show that he was not only original in devising, but that he possessed the peculiar skill and industry necessary to bring out the best results that can be obtained by perseverance. A classification of his paintings recently made includes 280 different titles, many of which are valued highly. Among his most noted are "Jesus Healing the Sick," "Jesus Before Pilate," "John the Baptist Preaching," "Simeon in the Temple," "The Wife of Samson," "The Descent from the Cross," and "Samson in Prison." His miscellaneous paintings include "A Lesson in Anatomy," "The Night Watch," "Portrait of Jan X.," "The Syndics of Amsterdam," and "The Burgomaster and His Wife."

REMENYI (rĕ'măn-yĕ), **Eduard**, violinist, born at Heves, Hungary, in 1830; died in 1898. He studied under Joseph Böhm in the Conservatory in Vienna, but took part in the Revolution of 1848 against Austria, on account of which he was compelled to leave the country. The following year he came to the United States, but went to Weimar, Germany, in 1853, and later settled in England, where he received an appointment under Queen Victoria. The general pardon of 1860 permitted him to return to Hungary, after which he traveled as a musician in Canada, Mexico, China, and the leading countries of Europe. His death occurred in California while he was touring the United States. He ranked among the leading musical artists of his time.

REMINGTON (rĕm'ing-tŭn), **Frederic**, artist, born at Canton, N. Y., Oct. 4, 1861; died Dec. 26, 1909. He studied at the Yale Art School for two years and for some time lived on a ranch in Montana and later in Wyoming. While associated with the ranchers and cowboys he gathered many sketches in connection with the Indians and men of the plains. In 1884 he began to contribute to several magazines and later furnished the illustrations for several articles written by Theodore Roosevelt. His paintings include "The Dash for the Timber," "Conjuring the Buffalo Back," and "The Bronco Buster."

REMSSEN (rĕm'sĕn), **Ira**, chemist, born in New York City, Feb. 10, 1846. In 1865 he completed by graduation a course of study in the College of the City of New York, attended the New York College of Physicians and Surgeons, and afterward studied at the University of Göttingen, Germany. He was assistant professor of chemistry at the universities of Munich, Tübingen, and Göttingen from 1870 to 1872, and in the latter year was made professor of chemistry and physics at Williams College. He became professor of chemistry at Johns Hop-

kins University in 1876 and succeeded Dr. Gilman as president of that institution in 1901. Besides publishing many text-books, he made a number of original investigations in organic and inorganic chemistry. In 1879 he founded the *American Chemical Journal*, of which he was editor a term of years. Among his publications are "Organic Chemistry," "Elements of Chemistry," "Principles of Theoretical Chemistry," and "Introduction to the Study of Chemistry."

RÉMUSAT (rà-mü-zà'), **Charles François**, statesman and philosopher, born in Paris, France, March 14, 1797; died June 6, 1875. He was educated at the Lycée Napoleon and soon after engaged in journalism. In 1818 he became closely connected with the party leadership of Guizot, and published a pamphlet of considerable merit on "Trial by Jury." He became a contributor to the *Globe* in 1824 and in 1830 entered the French chambers as deputy, in which he was an influential member until 1848. His support was given to the ministry of Casimir Perier and, when the government passed to Thiers, he became minister of the interior. Louis Napoleon exiled him when he ascended the French throne in 1851, and while abroad he gave his attention to literary and scientific studies, but when Thiers became president, in 1871, he was called to the portfolio of foreign affairs, in which he served with distinction until 1873. He is the author of a number of excellent works on scientific subjects, the most noted production being his "Essays on Philosophy."

RENAISSANCE (rē-nā-sāns'), or **Revival of Learning**, the name used to designate an indefinite space of time in the development of culture and learning in Europe. In this sense it denotes the transition from the period of history known as the Middle Ages to that of modern civilization. Sometimes the term, which signifies literally a revival or new birth, is applied to the period commencing with the 14th and ending with the first half of the 16th century, which witnessed the revival of classical literature and the fine arts of the Western nations. It is true that the Middle Ages had a culture and civilization peculiar to that period, but the public mind was more or less stagnant and learning was confined almost entirely to the clergy. While the defects of former periods were remedied, the best of the preceding civilization was made a part of the Renaissance. It signifies the entrance upon a fresh stage of vital energy in general, implying a fuller consciousness and a freer exercise of faculties that had belonged to the mediaeval period. Though in large parts contemporary with the Reformation, it is not to be confounded with the latter movement, which was concerned more specifically with a series of events and group of facts.

RENAN (rē-nān'), **Joseph Ernest**, historian and essayist, born in Tréguier, France, Feb. 27, 1823; died in Paris, Oct. 2, 1892. He first attended school in his native town, but in 1839 en-

tered the Seminary of Saint Sulpice, Paris, where he studied for holy orders in the Catholic Church. In 1845 he abandoned his former view to become a priest, but continued to pursue the study of Hebrew, German and other languages with untiring energy. He was granted a prize in 1848 for a memoir on the Semitic languages. In 1849 he was sent on a literary mission to Italy, and in 1856 became a member of the Academy of Inscriptions. His next recognition came in the form of an appointment to study Phoenician civilization by making a tour of Syria, when he visited various parts of the Holy Land, which enabled him to publish his work entitled "Life of Jesus." In this he expressed skeptical views in relation to many accepted traditions, which caused public opinion to turn against him to such an extent that he had to abandon his professorship of Chaldee, Syriac, and Hebrew in the College of France, to which he had been elected in 1862. In 1871 he was restored to that position. He became a member of the French Academy in 1878, received the cross of the Legion of Honor in 1880, and was made grand officer in 1888. The works of Renan are very numerous, though his "Life of Jesus" is the best known and has been translated into many languages. Other works include "History of Israel," "History of the Origin of Christianity," "Recollections of My Youth," and "Influence of the Thought and Culture of Rome on Christianity."

RENNES (rĕn), a city of France, formerly the capital of Brittany, at the confluence of the Ille and Vilaine rivers, 190 miles southwest of Paris. It is on both sides of the Vilaine River, which is crossed by a number of stone and steel bridges. Among the noteworthy buildings are a cathedral of modern Grecian construction, the palace of justice, a number of fine schools, several hospitals, and a university. The manufactures include shoes, sailcloth, cotton and woolen goods, yarn, lace, paper, and earthenware. The city is surrounded by a fertile country producing wheat, rye, and fruit. It has important railroad facilities and river and canal navigation. It is well fortified and has a large arsenal. Population, 1916, 75,640.

RENO (rĕnō), a city in Nevada, county seat of Washoe County, on the Truckee River, in the western part of the State, 31 miles north of Carson City. It is on the Virginia and Truckee, the Southern Pacific, and the Nevada, California and Oregon railroads. Among the principal buildings are the county courthouse, the Carnegie public library, the Nevada State Hospital for Mental Diseases, the Nevada State University, the Bishop Whitaker School for Girls, and several public schools. Reno has a considerable trade in merchandise. The surrounding country is devoted to farming, mining, and stock raising. It was settled in 1868 and the present charter as a city dates from 1903. Population, 1900, 4,500; in 1920, 12,016.

RENSSELAER (rĕn'sĕ-lĕr), a city of New York, in Rensselaer County, on the New York Central and the Boston and Albany railways. It is situated on the Hudson River, opposite Albany, with which it is connected by several bridges. The surrounding country is agricultural and dairying. It has several fine school buildings and churches, and carries considerable trade in produce and manufactures. Electric lighting, pavements, and electric railways are among the public utilities. It has extensive railroad machine shops, lumber yards, round-houses, and freight yards. It was incorporated as the village of Greenbush in 1815 and was chartered under its present name as a city in 1897. Population, 1905, 10,715; in 1920, 10,823.

RENT, the compensation paid for the possession and use of land, houses, or property of any kind. The term is applied in an economic sense only to the annual payment made for the use of lands employed in producing such wealth as it yields by tilling. In this sense it attaches to and proceeds from things fixed or immovable. It is paid either in money at a fixed amount annually, or by giving a share of the crops produced. The rate of rent accruing to a landlord may be said to be fixed by free competition, since the character of the work done by the tenant and the rate offered for possession determine largely what particular person may occupy the land. Rents depend chiefly upon fertility of the soil, facility or difficulty of cultivation, and situation as to an available market.

That the highest rent may be secured for lands of fertile soil is quite apparent, but it is likewise important that it be of such a character as to render cultivation reasonably easy, otherwise the extra expense for machinery and labor renders production more costly and the profits correspondingly less. Proximity to market is a very important factor, since thereby the capabilities of the soil can be more easily utilized. Besides, the cost of transportation to a distant market materially reduces the profit and renders it less easy to place the products for sale at the most opportune time. The factor of maintaining virgin fertility of the soil is also taken into account and even enhancing its productiveness, which is always facilitated by nearness to a large city, through enlarged consumption on the farm, or by returning to the land an equivalent for what is produced. In many cases the productive quality of the soil has been increased two, five, or even tenfold by tilling, careful cultivation, and the addition of manures hauled from the cities.

RENWICK (rĕn'wĭk), **James**, physicist, born in Liverpool, England, May 30, 1790; died Jan. 12, 1863. He descended from Scotch parentage, studied at Columbia College, New York City, and became an instructor in philosophy and chemistry in that institution. In 1820 he was called to the chair of these sciences. The government of the United States appointed him

as one of the commissioners to explore the boundary between that country and New Brunswick, in which capacity he served in 1838. For some years he was a trustee of Columbia College. His books include "Chemical Philosophy," "Treatise on the Steam Engine," "Elements of Mechanics," "Life of John Jay," "Chemistry Applied to the Arts," and "First Principles of Chemistry."

REPPLIER (rĕp-plĕr'), **Agnes**, authoress, born at Philadelphia, Pa., April 1, 1855. She descended from French parentage, studied at the Sacred Heart Convent, Torresdale, Pa., and later at the University of Pennsylvania. At various times she traveled as a means of gathering material for her literary work. She contributed extensively to magazines, such as the *Atlantic Monthly* and became popular for the delightful style and witty irony of her writings. Her books include "Points of View," "The Place and the People," "Essays in Idleness," "Books and Men," "Book of Famous Verse," and "In the Dozy Hours, and Other Papers."

REPRIEVE (rĕ-prĕv'), the postponement of the execution of a sentence imposed by a court of record. A suspension of this kind may be granted by the executive of a state or nation, or by the judge of such a court. However, in some instances the right to grant a reprieve or a pardon is vested in the board of pardons, subject to the approval of the chief executive. Reprieves are granted for various causes, including an opportunity to investigate the legality of the conviction, the sudden insanity of the prisoner, and favorable indications in the prisoner that may appear to justify a postponement of the execution or the commutation of the sentence.

REPTILES (rĕp'tĭlz), a class of cold-blooded air-breathing vertebrates. They are classed as occupying a place in the animal kingdom between birds and amphibians. The body is generally elongated, terminating in a long tail, and the skin in most species is covered with scales or scutes. They are distinguished from the amphibians in that they breathe air through lungs during the whole period of their lives, and from birds in having scales, instead of feathers, and cold blood. Like birds, many species of reptiles are oviparous, that is, their young are produced from eggs incubated outside the body; while some are ovoviviparous, producing eggs that are incubated or hatched within the parent's body. Most species have four limbs, which are barely long enough to keep the body from the ground, but many are without limbs, as the serpents and some of the lizards. When present, the limbs have many carpal and metacarpal bones.

Reptiles are now classed in ten orders, six of which are extinct. The four represented by living forms include the Lacertilia, Crocodilia, Ophidia, and Chelonia. The order of *Lacertilia* includes the lizards, chameleons, and blind-

worms; the *Crocodylia* embraces crocodiles, alligators, and gavials; the *Ophidia* includes the snakes; and the *Chelonia* comprises the turtles and tortoises. All the turtles and tortoises have a round body, which is covered by a hard shell, and they are characterized by a long tail. The senses are more highly developed than those of fishes, but duller than in birds and mammals. Nearly all are slow in their movements, but, as they bear more bruising than other animals, their life is less easily destroyed. Most species of reptiles are flesh eating. Snakes swallow their food whole, the stomach and gullet being capable of great distension, while crocodiles and tortoises masticate quite carefully.

In some cases, as in the python, the eggs are hatched by the warmth of the body, but they



PLESIOSAURUS.

are mostly laid in the warm sand to be hatched by the sun, or by the warmth of decaying vegetable matter. Reptiles are most numerous in warm climates, where they attain their greatest size. Some are aquatic, as certain snakes, crocodiles, and tortoises, and others live in trees or burrow in the ground, as the lizards. They generally hibernate in winter, or the cold season. The crocodiles and alligators are the largest living reptiles, and the structure of the vital organs most nearly resembles those of the birds. Snakes are peculiar for shedding the skin periodically. About 2,000 species of reptiles have been enumerated.

The reptiles antedate the Permian period. This is evidenced by the remains of these animals found in the Permian rocks of North America and Europe. Indeed, the living representatives are insignificant as compared with the vast multitude of large reptiles which are known to have lived in the ages of the remote past. They included both marine and land forms of large size, including vegetable feeding as well

as carnivorous animals, some of which suggest the present snakes, porpoises, whales, and sloths. The *plesiosaurus*, an extinct marine reptile with a long neck, a small head, and paddles for swimming, is a type of the Mesozoic age. Others include the *ichthyosaurs*, the *pterodactyls*, and the *dinosaurs*.

REPUBLIC (rê-püb'lik), the form of government in which the sovereignty is vested in the people, the administration being lodged in officers who are elected by, and directly represent, the people. The element of democracy is necessarily included in the management of a republic, since the extension of suffrage to the people is *democratic*, while the representative feature in law-making and law-executing is the *republican* element. The government of the

United States is democratic-republican, but it is generally known as a republic. In reality there are two distinct classes of governments in most republics, known as State and Federal. Before the thirteen original states ratified the Constitution each possessed an independent national sovereignty. When it entered the Federal Union it became subject to the general Constitution, but it retained a dependent republican government. The nation is bound to preserve the right of republican government in each of the states, an obligation laid upon it by the national Constitution. Thus, each State has a constitution more or less similar to that of the other states, and is dependent upon and limited by the Constitution of the

Federal government.

Republics had their origin in the opposition that prevailed against hereditary monarchies, as was the case in Greece, Rome, and most countries of North and South America. The essential features have continued to be principally the control of the chief executive by elections and in laws emanating from assemblies chosen by an enfranchised class. In ancient Greece the government of the small states partook of the nature of a democracy, where the whole body of citizens met to enact their laws, while the republics of Genoa, Venice, and others of mediæval Italy partook of the nature of an oligarchy, since the right of suffrage was vested almost entirely in the nobles and a few privileged individuals. The representative form prevails in all modern republics. Nearly all have a written constitution. They vest the right of suffrage in the male citizens. In most cases they choose the chief executive indirectly, some through an electoral college, as in the United States, or by the legislature, as in France and

Switzerland. The legislative authority is generally vested in an assembly of two chambers or houses, and the judiciary has power to pass upon the constitutionality of the laws and executive acts.

Germany, Switzerland and France are the only powerful republics of Europe; the others include Poland, Austria, Finland, Jugo-Slavia, Czecho-Slovakia, Hungary, Ukraine, Andorra, Monaco, and San Marino. The last named is the oldest republic in the world. France was a republic at three different periods, in 1793-1804, in 1848-1852, and from 1870 to the present time. The seven provinces of Holland organized a republic at the time of their separation from Spain and maintained it until 1815. The government of England was a nominal republic from 1649 to 1660, and Spain was so governed at two periods—in 1868-69 and in 1873-74. In 1776 the American colonies declared their independence, but the United States was not organized as a constitutional republic until 1789. Mexico obtained its republican government in 1824, which it has ever since possessed, except in the brief period of Maximilian's reign, from 1863 to 1867. All the independent countries of America are now republics, Brazil obtaining that form of government in 1889. At present there is a marked tendency toward the establishment of republics, or toward limiting the power of monarchies by constitutions. It is not at all improbable that the present century will witness the establishment of republics in many regions governed at present by powerful monarchies.

REPUBLIC, Grand Army of The. See **Grand Army of the Republic.**

REPUBLICAN PARTY, the name first applied to the party formed by Jefferson in opposition to the Federalists, which assumed the name as an advocate of a republic, while its opponents were classed as Monarchists. However, the name soon gave way to that of Democrat, chiefly because the party advocated vesting large powers in the people. The present Republican party was not organized until in 1854. It was formed by a union of smaller parties and factions that left the Whigs and Democrats on account of various phases of the slavery question. It may be said that the Whig party was disrupted by the compromise of 1850. In 1854 the Democrats passed the Kansas-Nebraska Act, which was immediately followed by a union of various elements that united in opposition to that measure, among them the Know Nothings, Abolitionists, Free Soilers, Whigs, and numerous Democrats. The party was first known as anti-Nebraska men, but soon assumed the name of Republican and won a plurality in Congress. In 1856 the first national convention was held in Philadelphia, which nominated Fremont and Dayton for President and Vice President. The platform adopted by this convention declared against the repeal of the

Missouri Compromise, opposed the extension of slavery to the territories, and advocated the admission of Kansas as a free State and the construction of a railroad to the Pacific. In the campaign "Free soil, free speech, free men, Frémont" became the rallying cry, and, though overwhelmingly defeated, the party elected 92 out of 237 Congressmen.

Thousands of voters broke away from the Democratic party on account of the Dred Scott Decision and the Lecompton Bill, and the division of that party in 1860 brought about the election of Abraham Lincoln. The first election of a President by the Republicans hastened on the Civil War, but before 1864 a split occurred in the party, the dissenting faction nominating John C. Frémont for President at a convention in Cleveland. However, the Republicans temporarily assumed the name of the National Union party, renominated Lincoln, and placed Andrew Johnson, a Democrat, on the ticket for Vice President. The latter succeeded to the Presidency in 1865, owing to the death of Lincoln, and immediately the question of reconstruction began to agitate the nation. The Fourteenth Amendment, the civil rights bill, the reconstruction bill, the Freedmen's Bureau Bill, and the tenure of office act were passed. President Johnson's opposition to a number of these measures caused his impeachment.

A new class of leaders arose with the election of General Grant, in 1868, among them Sherman, Blaine, Conkling, Edmunds, and Allison. President Grant was reelected for a second term and was followed successively by Hayes and Garfield. The latter dying in office, he was succeeded by Chester A. Arthur. In 1884 the nomination of Blaine caused a division of the party in New York and other eastern states, thus assuring the election of Grover Cleveland, the Democratic candidate. However, Benjamin Harrison was elected in 1888. He was defeated when a candidate for reelection, in 1892, by his Democratic opponent, Grover Cleveland. The party elected William McKinley in 1896 and reelected him in 1900. After his assassination in 1901, he was succeeded by Theodore Roosevelt, who was elected President in 1904. William H. Taft was elected in 1908, defeating W. J. Bryan, but he was defeated in 1912 by Woodrow Wilson, who also defeated Charles Evans Hughes in 1916. In 1920 Warren G. Harding was elected by the largest majority ever polled, defeating James M. Cox.

The Republican party has always depended for its strength upon the North and West. Its positions have been modified by the character of national events, but it has been constant as an advocate of national banks, a high protective tariff, and internal improvements during its entire existence. Among the positions taken on questions already settled or now in a state of discussion are those including opposition to the extension of slavery, in favor of a

vigorous prosecution of the Civil War, the Emancipation Proclamation, the demonetization of silver in 1873, the resumption of specie payment in 1879, a general increase in pensions, the acquisition of territorial possessions in regions remote from the United States, and an increase in the standing army. The period of American history during which the Republican party controlled the executive branch of the government is forty-four years. See **Political Parties in the United States**.

REPUDIATION (rê-pū-dī-ā'shŭn), the rejection of the whole or part of a contract, debt, or obligation. The several states are limited by the Constitution in that they may not pass laws to impair the obligations of contracts, but the Eleventh Amendment provides that the Federal Supreme Court has no jurisdiction of suits brought against a State by a citizen of another State. Hence, states have been at liberty to either repudiate or acknowledge debts, but acts of repudiation have occurred generally only on grounds of unlawful or fraudulent transfer coupled with failure of consideration. This was the case in 1841, when Mississippi repudiated bonds issued to railroad companies, which failed to comply with the conditions on which they received them. Among the other states repudiating at various times are Georgia, Alabama, Louisiana, Minnesota, Florida, Michigan, Tennessee, Arkansas, Virginia, and the Carolinas, though in some states bills were passed to refund the debts.

RESACA DE LA PALMA (râ-să'kà dâ lâ pâl'mâ), **Battle of**, an engagement of the Mexican War, fought on the plains at Resaca de la Palma, in Cameron County, Texas, on May 9, 1846. The Americans under General Taylor had an army of 2,300 men, while the Mexicans under General Arista numbered about 5,000. The center of the battle was in a ravine covered by a thick growth of timber, and the day was won for the Americans by a charge of dragoons. Both sides lost heavily.

RESERVATION (rêz-êr-vā'shŭn), a tract of land set apart by the government for public uses or for special purposes. A large number of reservations have been made in different parts of the country for divers purposes, such as providing sites for forts and government buildings, preserving tracts for the forests, and retaining scopes of country for the special use of the Indians. The most extensive reservations in the United States are the Yellowstone National Park and the tracts set apart for occupation by the Indians. Canada has many forest preserves and Indian reservations.

RESERVOIR (rêz'êr-vwôr), the term applied to any receptacle for storing up a fluid, but employed most extensively in describing an artificial basin to retain water until it can be used in economic and industrial enterprises. Reservoirs are divided into several classes, of which the more important are for storage, im-

pounding, settling, and distributing purposes. In many cases great engineering skill is required to plan the constructions of basins of this kind, since the pressure is an item to be considered, as well as freezing, flooding, and influences exercised by overflows.

Storage reservoirs are frequently formed by constructing a dam across some stream, but in many instances they are made either in part or wholly by excavations and embankments. To this class belong the great reservoirs connected with the Croton dam of New York City, which serves in supplying the city with water. It has a capacity of about 35,500,000,000 gallons. The Wachusett dam of Boston retains about 63,000,000,000 gallons; the Periyar dam of India, 100,000,000,000 gallons; and the Assuan dam of the Nile, about 280,000,000,000 gallons. These dams provide storage reservoirs of greater capacity than any others in the world. *Impounding reservoirs* are constructed by building a dam across some stream, the purpose being to flood the country above. *Settling reservoirs* are maintained to purify the water by aërating and permitting the mud to settle. *Distributing reservoirs* are comparatively small and serve to retain a supply of water in different parts of the city. Formerly the construction was largely of stone, but cement and concrete are the principal materials used in building reservoirs at present.

RESINS (rêz'inz), a class of vegetable substances, being the product of oxidation of volatile oils secreted by certain plants. They are hard or soft according to the amount of oil they contain and the length of time they have been exposed to the air. Resins are either transparent or translucent, are somewhat elastic, and generally are soluble in alcohol, but insoluble in water. The resins are divided into three general classes, including those obtained from fossils, those extracted from plants by alcohol, and those exuding from plants spontaneously. Those obtained from fossils are derived from amber, coal, asphalt, and lignite; those extracted from plants by alcohol embrace such as the resins of angelica root, which generally contain definite carbon compounds; and those that exude from living plants include benzoin, Peru balsam, turpentine, lac, myrrh, copal, jalap, and storax. The last mentioned resins are obtained by making incisions in the stems and branches of plants, but in some plants they form drops of tears naturally. Many of the resins are used in medicine and mechanic arts, and are sold extensively as commodities in the trade.

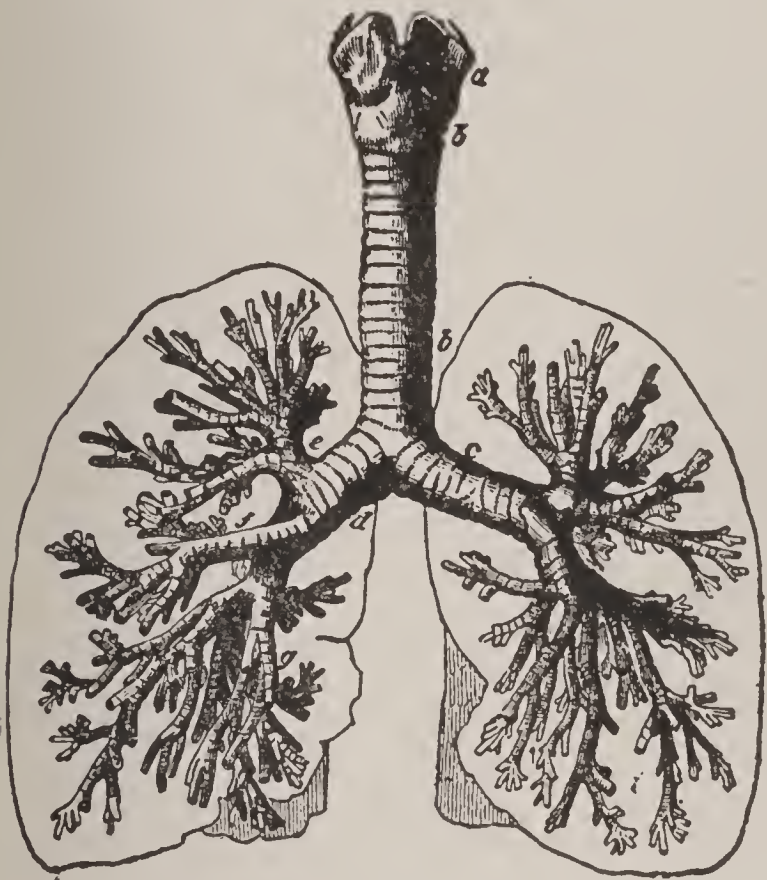
RESPIRATION (rêz-pî-rā'shŭn), the process of breathing, which consists of two acts: taking in the air, or *inspiration*, and expelling the air, or *expiration*. It is partly nutritive and partly excretory in its character, since it revives the blood by taking in oxygen and casts out waste products in the form of carbonic acid. Besides carbonic acid, there is a quantity

of water and organic matter given out by the breath, which may be seen more or less clearly by breathing on a glass or windowpane at low temperature. Respiration is carried on in man and the higher animals mainly by the lungs. The air enters into the mouth or nose, passes through the larynx, a kind of hollow chamber extending from near the root of the tongue to the trachea, or windpipe, whence it passes into the lungs through two bronchial tubes. On entering the lungs the bronchial tubes divide and subdivide, usually by twos, into smaller tubes called *bronchi*, and the whole appears like a tree with many branches. The larynx is a framework made up of cartilages held together by small ligaments, and forms the projection called *Adam's apple*. An elastic plate called the *epiglottis* is at the upper opening of the

the air outward. Ordinarily breathing is done mainly by moving the diaphragm. It takes place about eighteen times per minute during the waking hours, or at the rate of one breath to every four beats of the heart. The lungs of a healthy adult have a capacity for about 330 cubic inches of air, and in ordinary breathing about thirty cubic inches pass in and out, though it is possible to take in fully 100 cubic inches in a deep inspiration. A quantity of air is always in the lungs. The constant supply is equal to about 100 cubic inches, this being important for the reason that the action of the air goes on continuously.

In the process of breathing the blood comes in contact with the air as it is pressed into the air cells of the lungs, where it takes up the oxygen and in turn gives up carbonic acid gas and other impurities taken up in its circulation through the body. By this process it is changed from dark blue to a bright red color. Thus purified and laden with the inspiring oxygen, it goes bounding through the system, while the air we exhale carries off the impurities. If respiration is interfered with, the arterial blood becomes dark like that of the veins, and, when death takes place by asphyxia, as it does when respiration is impeded, the body assumes a very dark color. Foul matter passed off from the lungs diffuses itself through the surrounding atmosphere, and, if good ventilation is not provided in rooms occupied by a number of persons, the air becomes largely poisoned by impurities. As a result the system suffers from a lack of oxygen, which is speedily followed by drowsiness, headache, catarrh, and finally by serious and fatal diseases.

Respiration in fishes is carried on by the gills, the water inhaled giving up oxygen, while that exhaled carries off nitrogen and other impurities. The reason that fishes cannot long endure in stagnant water is that oxygen is rapidly consumed in the process of breathing; thus, it becomes necessary to frequently replace water in vessels where fish are kept. No special apparatus is provided for the aëration of fluids in the body of the lowest and simplest forms of animals, this being effected by the general movements of the body, or by cilia producing the necessary currents. Some animals are incapable of breathing either air or water, and in such the process is carried on by the skin or through small sacs at regular intervals on each side of the body, as in the leech and earthworm. Respiration is carried on in insects by spiracles opening into tubes, which communicate with each other through the body. Plants have a respiratory process somewhat similar to that of animals, but they take in carbonic acid as the vital element and exhale oxygen, thus reversing the action of the animal. However, the normal respiration in plants takes place only in the presence of light. Thus, it will be seen that nature has provided elements alike



LUNGS.

Distribution of Air tubes in Mammalian Lungs. *a*, larynx; *b, b*, trachea; *c, d*, left and right bronchial tubes; *e, f, g*, the ramifications.

larynx, which closes down over its entrance while swallowing, thus preventing the admission of food substances into the bronchial tubes.

The tubes in the lungs terminate in minute air cells, which are inclosed by transparent and very thin walls, and through them ramify minute blood vessels, lymphatics, and nerves. As the air enters the lungs, the diaphragm, a thin partition between the chest and the abdomen, is lowered, while the ribs are raised, thus increasing the size of the chest. Thereupon, the elastic lungs expand to occupy the extra space, while the air rushes in through the windpipe and pours along the bronchial tubes, crowding into every cell. The operation is reversed when the air is expelled. The walls of the abdomen are drawn in, the diaphragm is pressed upward, and the ribs are pulled downward, thus diminishing the size of the chest and forcing

essential to both forms of life, and that each is dependent at least to some extent upon the other.

RESTIGOUCHE (rēs-tī-gōōsh'), a river of Canada, in the northwestern part of New Brunswick, forming a part of the boundary between that Province and Quebec. It rises in Madawaska County, whence it flows toward the northeast, discharging into Chaleurs Bay. The Patapedia, the Matapedia, and the Upsalquitch are its principal tributaries. It has a total length of 200 miles, of which about half is navigable for small boats, while the largest vessels ascend a distance of twenty miles.

RESURRECTION (rēz-ūr-rēk'shūn), the awakening or raising of mankind immediately preceding the last judgment. The doctrine of the resurrection is maintained by all Christians and in some form it is supported by the Jews and Mohammedans. The Zoroasterians taught it definitely and it was suggested by the teachings of Plato and in the mysteries of the Egyptians. This doctrine was a fundamental belief of the Pharisees, but was disputed by the Sadducees. Christ and the apostles revealed it in the New Testament.

The Christian churches base their belief in this doctrine upon the resurrection of Christ. It is recorded that he rose on the third day after death, when his body was identical to it at the time of the crucifixion, except that it was changed as to its mode of being. Accordingly, it is held that all the dead are to rise on the last day to be judged according to the deeds done in this life, after which the good are to enjoy bliss and the bad are to undergo punishment. Most of the fathers of the church believed in the resurrection of the flesh, but later a distinction was made between the flesh and the body. Origen reaffirmed a distinction between the resurrection of the body and the flesh, referring to the former as the *essence* and to the latter as the *phenomenal form*. This view was generally held by the reformers, who looked upon the body as the creature of God, the redeemed by Christ, and the temple of the Holy Ghost.

RESZKE (rēsh'kě), **Jean de**. See **De Reszke, Jean**.

RETAINER (rê-tān'ēr), a fee paid to an attorney or councilor at law, or the employment of an attorney to prosecute or defend a cause. A retainer may be either in writing or in the form of a verbal request. One employed in this manner is authorized to represent a client in a suit, under such rules and regulations as may be in use in the court. A *retainer*, or a *retaining fee*, is sometimes paid to an attorney with the understanding that he will hold himself in readiness to represent the applicant in the court, although the arrangements to do so are to be made at some future time.

RETIREMENT (rê-tīr'mēt), the act of retiring a military or naval officer from active

duty, especially where such an officer has reached the age at which active service is limited. Such limits are recognized in all the leading nations and the officers who thus retire in most cases receive a regular salary and an increase in rank. Great Britain permits voluntary retirement with gratuities or pensions, but requires such retirement when the age limit is reached. In the United States the navy officers retire at 62 and the army officers at 64 years, but the President may retire an army officer at 62. Officers who are on the retired list in the United States receive 75 per cent. of the pay of their rank.

RETORT (rê-tôrt'), a vessel used for the decomposition of compound bodies by heat, or for distillation. The retort of the chemical laboratory is of glass, platinum, porcelain, or other material. It consists essentially of a bulb with a long neck attached, in which the products of distillation are condensed, and from it they pass into the receiver. Retorts are of various shapes and the materials from which they are made differ somewhat with the uses they are to serve. Where a high degree of heat is necessary, iron or metal retorts are used, since glass and many other substances are not proof against a high temperature.

RÉUNION (rê-ūn'yūn), or **Bourbon**, an island in the Indian Ocean, situated between Madagascar and Mauritius. It is about 35 miles long and 22 miles wide. The area is 780 square miles. The island is of volcanic origin, but the summits are now extinct, except Piton de la Fournaise, which is active. The surface is mountainous, ranging from 2,000 to 10,065 feet, which is the height of Piton des Neiges, the culminating peak. Much of the surface is fertile, especially along the coast and in the valleys. Sugar, coffee, vanilla, timber, and tropical fruits are the principal products. The inhabitants consist chiefly of Africans, Chinese, and natives. Portuguese navigators discovered the island in the 16th century, but it became a possession of France in 1649. It is governed under the municipal code of France. The executive power is vested in a governor, who is assisted by a privy council. Population, 1908, 175,240.

REUTER (roi'tēr), **Fritz**, novelist and poet, born in Stavenhagen, Germany, Nov. 7, 1810; died in Eisenach, June 12, 1874. He studied under private tutors until 1832, when he entered the University of Jena, and in 1833 engaged in revolutionary agitation against the Prussian government. This brought about his arrest for high treason, and, after a trial, he was condemned to death, but the sentence was commuted to imprisonment for thirty years by Frederick William III. He was set free in 1840 by an amnesty issued when Frederick William IV. ascended the Prussian throne, and henceforth gave his entire attention to literature. His writings are realistic in character,

dealing mostly with the actual conditions of life, and many of them are remarkably popular on account of the happy manner in which he describes incidents and circumstances with which he met. Most of his poems and some of his novels are written in the *Platt-Deutsch* dialect. "My Prison Days" and "In the Year 113" are his best known works.

REVAL (rěv'el), or **Revel**, seaport of Europe, capital of Esthonia, on the Gulf of Finland. It is 200 miles southwest of Saint Petersburg, with which it is connected by railroads. Among the noteworthy buildings are the townhall, the central railway station, the capitol building, the merchants' exchange, and three gymnasiums. It is popular as a summer resort for boating and bathing. The city has a system of waterworks, the supply being carried from Lake Jarvakyla by an aqueduct. It has manufactures of machinery, clothing, cotton and woolen goods, utensils, and cordage. The harbor of Reval, which remains open throughout the year, has a large commerce. The Germans captured Reval by a combined land and sea attack in 1918. Population, 1914, 99,685.

REVELATION (rěv-ě-lā'shŭn), **Book of**, the name of the last book of the New Testament, which is sometimes called the *Apocalypse of Saint John*. It has been the subject of more or less discussion, since both the authorship and the date of its composition are uncertain. Issued at a time when religious persecutions were practiced, it was probably written in opposition to the practices of the Roman Empire, but at the same time to encourage the faithful to persevere until the coming of judgment and the deliverance. In the first part are letters written to seven Christian churches in Asia Minor, which are followed by visions and prophecies relating to the fall of Jerusalem, the power of the world that opposes Christ, and the glory of the heavenly and eternal Jerusalem. See **Apocalyptic Number**.

REVERE (rē-vēr'), a town of Massachusetts, in Suffolk County, a short distance northeast of Boston, on the Boston, Revere Beach and Lynn and the Boston and Maine railroads. It is improved by street pavements, waterworks, and sanitary sewerage. Many Boston business men make it their place of residence. The principal buildings include the Carnegie library, the high school, the townhall, and the public bathhouse. Revere was settled in 1626, when it was known as Rumney Marsh, and received its present name in 1871. Population, 1920, 28,823.

REVERE, Paul, patriot, born in Boston, Mass., Jan. 1, 1735; died May 10, 1818. He was by trade a goldsmith and practiced copperplate engraving. Many events of the times preceding the Revolution were illustrated by him in engravings and caricatures. He was one of the prime movers of the Boston Tea Party and on April 18, 1775, apprised the citizens of Lexington and Concord of the intended expedition of the

British. This eventful act was made the subject of Longfellow's poem, "The Midnight Ride of Paul Revere." He entered the army at the beginning of the war and attained to the rank of lieutenant colonel of artillery. Subsequent to the war he established the Revere Copper Company, the first company to refine and roll copper in America, which is still doing business. In 1795 he laid the corner stone of the Massachusetts capitol and founded the Charitable Mechanical Association.

REVIVAL (rē-viv'al), the name used among Protestants to denote a time of active work in the church, usually a period of two to six weeks. In this sense it applies only to certain Evangelical churches, such as the Methodist, Baptist, United Brethren, and Presbyterian. These denominations and a number of others set apart a brief period for specially active work among the members and in the community to strengthen their faith and extend the Christian belief and practice. It is a time for local missionary work, when new members are to be brought in and when the spiritual welfare is to be emphasized with special fervor. Formerly these revivals were conducted by the local ministers with the aid of the elders and the other officials, but later aid came to be extended by other ministers of the same denomination, and finally Evangelists were appointed or chosen to carry on the work at certain periods of the year. For this purpose camp meetings were organized, since the buildings rarely furnished ample accommodations for the large numbers in attendance, or tents were erected to supplement the seating capacity of the church edifices.

Church revivals may be said to have reached their height in the time of the Crusades, when a general movement was inaugurated in Europe to establish a permanent foothold for Christianity in Asia. The Crusades cover the period from 1096, the beginning of the first Crusade, until 1291, when Acre was captured by the Sultan of Egypt. Another great period of revivals spread over Europe at the time of Reformation, which may be said to have been inaugurated by John Huss in Bohemia, by Luther and Zwingli in Germany, and by Bruce and Livingston in England and Ireland. John Wesley and George Whitefield, in the 18th century, conducted a revival in England that gave rise to the Methodist and other evangelical churches. New England witnessed a revival under the preaching of Jonathan Edwards. The camp meeting was the forerunner of the Chautauqua assembly, which may be said to have brought about in the educational and literary fields what has been done by the revivals in a spiritual way. Moody and Sankey, who united preaching with singing, and William A. Sunday induced an extensive revival movement in the United States. Work of a similar character is carried on by the Roman Catholics through organization work known as *missions*, which

are designed to renew spiritual activity and perpetuate religious fervor.

REVOLUTION (rěv-ô-lū'shŭn), any fundamental change in government, or a revolt against an existing government and the establishment of a new one in its stead. Revolutions are mainly brought about by internal causes. However, the change must be accomplished completely to constitute a revolution, otherwise it is generally termed a *rebellion*, or an *insurrection*. Among the notable revolutions of modern times is that of England in the 17th century, which began in 1642 with a quarrel between Charles I. and his Parliament and ended in 1649, when the king was brought to the block. A republic was organized with Oliver Cromwell as protector, but the monarchy was restored in 1660 by the return of Charles II. The great Revolution in America began in 1776, when the colonies declared their independence of Great Britain. It ended with the surrender of Cornwallis at Yorktown in 1781. The great Revolution of France began at Paris in 1789 and ended with the beheading of Louis XVI. on Jan. 21, 1793, though some writers place the end in 1794, when Robespierre was guillotined. Two other revolutions occurred in France. The one of 1830 deposed Charles X. and placed Louis Philippe on the throne and the Revolution of 1848 established the second republic. Some writers regard the establishment of the third French republic, in 1871, as a revolution. The republics of South America were practically all established by revolution, including the Republic of Brazil. Russia underwent two vast revolutions, those of 1904 and 1917.

REVOLUTIONARY WAR IN AMERICA. See **United States**, page 2979.

REVOLVER (rê-vôlv'ěr), a firearm which resembles the pistol, but differs from it in having a breech-loading cylinder so arranged that the cocking of the hammer revolves it and brings the next cartridge in line for firing. Many kinds of revolvers are in use. They have from three to six chambers in the cylinder and differ widely in size and mechanical construction. The cheaper kinds are cocked by means of pulling the hammer back with the finger, while the more expensive are self-cocking; that is, they may be cocked and discharged by simply pulling the trigger. Others are made with a concealed hammer, thus guarding against the danger of being discharged by accident. In some revolvers is a safety latch to prevent them from being fired without first releasing the internal hammer by pressure. In 1818 Elisha H. Collier patented the first weapon of this kind in the United States, and in 1835 Samuel Colt invented the famous revolver that bears his name. The principle employed in a revolver is used also in rifles and guns designed to throw small projectiles, as in machine guns of the Gatling kind.

REYNARD THE FOX (rā'něrd), an epic

fable of the Middle Ages, written at some time between the 10th and 12th centuries. However, the first printed edition did not appear until 1517, when it was published at Rostock, Germany. It was written in the low German dialect by one signing himself Hinreck van Alckmer, but the real name of the author is believed to be Hermann Barkhausen, a book printer in Rostock, who wrote under a pseudonym. The characters in the story are animals, which are represented as speakers and actors. They are treated with such a degree of interest that many translations have been made into different languages, and few fables are at present better known or more popular.

The writer of Reynard the Fox represents that on one eastertide Nobel the Lion, king of beasts, held court, to which he summoned all the animals, both great and small, to do him homage. All gave willing obedience to the summons except Reynard the Fox, who was promptly summoned for this and other misdeeds to appear before the king of beasts, Bruin the Bear being sent to command his attendance. However, Reynard employed his well-known tactics to escape punishment by informing Bruin that a rich fund of honey could be found in a split tree, to which the bear at once hastened, but got fastened in his attempt to secure the honey and was almost beaten to death by angered peasants before he was able to escape. The Lion next sent Tibert the Cat as a messenger, but Reynard persuaded him to go on a chase by relating that a nest of mice could be found in a certain place, and in attempting to secure the prize he was caught in a noose and barely escaped with his life. Grimbart the Badger next went as a messenger, and, being less vain than those who had gone before, he succeeded in persuading Reynard to appear at court, where he was at once tried and it was decided that he should die. His death was to be by hanging.

When Reynard the Fox had ascended the gallows, he was asked if he had something further to say before suffering death. Instead of making a confession of his guilt, he turned to the Lion and informed him that Bruin the Bear and Isengrim the Wolf had planned to kill the Lion; but, since he and his old father Reynard were not friends of the wicked bear, he had stolen and hidden their treasure, for which reason he wanted to inform the Lion of his danger. The king of beasts at once pardoned Reynard and imprisoned both Bruin and Isengrim. Trouble again arose when the Lion wanted Reynard to show him the treasures, but he soon excused himself by saying that it was secure at some distance and that he did not have time to look it up immediately, as he had taken an oath to go to Rome on a pilgrimage.

The skillfully devised story was cause enough for the Lion to let Reynard go at once to redeem his vow. However, he took Belim the Ram and Cuwaert the Hare with him. Soon

after starting the three came to the home of Reynard, which he induced the Hare to enter by promising him rest and a good meal, but at once fell upon him and ate all but his head. This he put into a sealed satchel, which he sent back to the Lion by the Ram, telling the latter that it contained letters of great value. When the Ram reached the court of the Lion, the king of beasts was greatly angered, and not only declared the Fox an outlaw, but gave freedom to the Wolf and Bear. It happened soon after that the Wolf and Fox met in the forest, when the former undertook to punish Reynard for causing him to be imprisoned, but the latter won a victory by his cunning and was thereby restored to the protection of the Lion.

REYNOLDS (rĕn'ŭlz), **John Fulton**, soldier, born in Lancaster, Pa., Sept. 20, 1820; killed in battle July 1, 1863. He graduated at the West Point Military Academy in 1841, was given a commission as first lieutenant in 1846, and served in the Mexican War, securing especial distinction in the battles of Monterey and Buena Vista. Soon after the close of the Mexican War he served against the Indians in Utah, and in 1859 became commandant of cadets at West Point. In 1861 he was made brigadier general of volunteers, taking part in the campaigns of the Army of the Potomac, and was taken prisoner, but was exchanged soon after. He became major general in 1862 and in the same year succeeded General Hooker in command of the first army corps, but on the first day of the Battle of Gettysburg he was killed in action by a rifle ball. A number of monuments have been erected to his honor, one in Philadelphia and another on the spot where he fell and died.

REYNOLDS, **Sir Joshua**, portrait painter, born at Plympton, England, July 16, 1723; died Feb. 23, 1792. He was a son of Samuel Reynolds, rector of Plympton, who wished him to study medicine. However, his taste for painting predominated at an early age, and by the kindness of Captain Keppel he was enabled to study art in Italy for three years. In 1752 he returned to England and soon after established a studio in London, where he became noted as the most eminent portrait painter since Van Dyck. He was elected president of the newly organized Royal Academy in 1769. King George III. knighted him and at the death of Ramsey, in 1784, he became painter to the court. About 700 engravings have been made from the pictures of Reynolds. Among his productions are portraits of the most eminent personages of his time. His works are especially beautiful on account of trueness to life and exactness of detail. Reynolds was a personal friend of the most distinguished scholars and literary men of his day, among them Johnson, Goldsmith, Burke, and Garrick. He is the author of "Discourses on Painting," which he delivered in lectures before the Royal Academy. Besides the

large number of portraits furnished by him, he painted other pictures, including "The Holy Family," "Macbeth," and "Death of Cardinal Beaufort."

RHADAMANTHUS (răd-ă-măn'thŭs), in Greek mythology, a son of Jupiter by Europa and a brother of Minos, King of Crete. At Thebes he married Alcmene, the widow of Amphytrion, and subsequently he conquered and became the ruler of the Cyclades. On account of his inflexible integrity he was made one of the judges in the lower world, and as such was associated with Minos and Aeacus. According to Plato, he judged the souls of Asiatics, while Aeacus passed decrees upon those of Europeans, but when they could not agree Minos cast the deciding vote.

RHEA (rĕ'ă), the name of a large bird native to South America, found chiefly in the valleys of the Amazon and the La Plata. It is allied to the ostrich, but is distinguished from it by having no tail, three-toed feet, and a covering of feathers on the neck and head. Although the wings are unfit for flight, they are more highly developed than those of the ostrich and the emu of Australia. The body stands about three feet high, but the male is somewhat larger than the female. The color of the plumage is a brown tint. While the plumes of the wings are marketed for dust brooms, they are inferior to those of the ostrich and are little used for ornamentation. One male is usually associated with two or more females, who build a common nest and lay from twenty to thirty eggs, which are incubated by the male. These birds feed on grass, berries, worms and insects. In case of danger they run swiftly, when they use the wings as an aid to make good their escape. See **Ostrich**.

RHEA, or **Cybele**, the daughter of Uranus and Ge, that is, of Heaven and Earth, and the wife of her brother Cronus. She is reputed to have been the mother of Zeus, Hera, Hades, Hestia, Demeter, and Poseidon. According to some writers she was the symbol of the reproductive power of nature. Her ancient place of worship was in Crete, on Mount Ida, where she is said to have given birth to Zeus.

RHEIMS (rĕmz), or **Reims**, a city of France, in the department of Marne, on the Vesle River, eighty miles northeast of Paris. It is located in a fertile region, has extensive railroad facilities, and is one of the important commercial and manufacturing cities of France. A large cathedral in the Gothic style of architecture was built at Rheims in the 13th century. It has many other churches, several institutions of higher learning, and a fine public school system. The manufactures include cotton and woolen goods, blankets, champagne, machinery, earthenware, toys and scientific instruments. It has been the seat of an archbishopric since the 8th century and was made the place of coronation in 1179, when Philip Augustus was crowned

here. Rheims is famous as the place where Clovis was baptized in 496, for the crowning of the dauphin in the presence of Joan of Arc, and for the fact that all the French kings were crowned here down to 1825, except Henry IV., Napoleon I., and Louis XVIII. The city was occupied by the Germans in 1870, and bombarded successively for four years, beginning in 1914. The growth of Rheims is due largely to its extensive industries. Population, 1914, 118,240.

RHETORIC (rĕt'ō-rĭk), the art that treats of discourse, or the expression of thought by means of language, either oral or written. Aristotle wrote the first treatise on rhetoric, a work that is still considered valuable as a text of reference. He treated the subject as a branch of logic and applied its rules largely to oratory. Aristophanes of Byzantium was the first to introduce rhetorical points and accents and Quintilian carried on teaching in rhetoric in the Roman capital for more than twenty years, publishing his famous work on the subject, entitled "Education of an Orator." It may be said that Quackenbos (q. v.) is among the best known American writers on the subject.

Rhetoric is divided into two parts, style and invention. *Style* treats of the manner of expression and, as a word, was derived from the Latin *stylus*, a small steel instrument used by the Romans for writing on waxen tablets. *Invention* in rhetoric is the art of putting together what one has to say on a subject. It does not include finding out what to say, but rather consists in putting statements of facts, our observations upon men and things, our feelings, and our conclusions, into readable shape. The subject of invention is so extensive and complicated that no two authorities exactly agree upon every detail. As a whole, it may be said that rhetoric is the art by which the discourse is adapted to its end. This includes at least four important purposes in speaking or writing: namely, to enlighten the understanding, to please the imagination, to move the passions, and to influence the will.

RHEUMATISM (rū'mā-tĭz'm), an inflammation or malady with aching pain, usually of a variable or acute nature. It affects equally the muscles, the joints, and other structures. Exposure to cold and damp are among the ordinary causes of rheumatism, but it likewise results from severe labor, insufficient nutrition and the reduction of vitality by an over-consumption of stimulative food without sufficient exercise to eliminate the waste from the system. No specific time in life can be assigned in which it may attack the body, but rheumatic affections are most frequent between the ages of 15 and 35 years. Acute cases are generally attended by affections of the heart, particularly of the pericardium. Young persons are frequently attacked by a form known as *Saint Vitus' dance*. Swollen joints attended by severe pain often accompany rheumatism. Com-

plicated cases usually become chronic, often ending in severe deformity and twisting of the joints. A common form of muscular rheumatism is known as *lumbago*. Rheumatism is more or less hereditary.

RHINE (rĭn), or **Rhein**, an important river of Europe, one of the finest and most historical streams in the world. It rises in Switzerland, has a general course of about 765 miles toward the north and west, and flows into the North Sea. Two streams form the Rhine in the Swiss canton of Grisons, which are known as the Vorder Rhein and the Hinter Rhein. A short distance below the junction it passes through Lake Constance and at the town of Basel turns toward the north and enters Germany, in which country most of the river is located. The part from the vicinity of Saint Gothard's Tunnel to Basel is generally known as the Upper Rhein; the part from Basel to Cologne, as the Middle Rhein; and from Cologne to the North Sea, as the Lower Rhein. It enters Holland after turning toward the west, but soon divides into numerous branches, entering the sea by a delta.

The Rhine is an important commercial highway, being navigable a distance of nearly 600 miles. It is connected by numerous canals with other river systems, including those of the Danube and the Rhone. On its banks are many thriving cities, including Arnheim, Leyden and Utrecht, in Holland; Bonn, Coblenz, Cologne, Düsseldorf, Mentz, Mannheim, Strassburg, Spire, and Worms, in Germany; and Constance and Basel, in Switzerland. The principal tributaries are the Aar, Moselle, Main, Neckar, and Lippe rivers. The scenery of the Rhine is noted for its great beauty, both in Switzerland and Germany, but particularly in the latter country. In Holland it is less beautiful, owing to the generally level character of the region through which it passes. Much of the land of the Rhine delta has been redeemed by dykes. In some places the embankments are nearly thirty feet above sea level. More than a million tourists visit the Rhine every year.

RHINELANDER (rĭn'lān-dēr), a city of Wisconsin, county seat of Oneida County, 102 miles northwest of Green Bay. It is on the Wisconsin River, at the Pelican Rapids, and has communication by the Chicago and Northwestern and the Minneapolis, Saint Paul and Sault Sainte Marie railroads. The surrounding country produces lumber, cereals, and live stock. Extensive water power is furnished by the Pelican Rapids. The chief buildings include the county courthouse, the high school, and several fine churches. Electric lighting, waterworks, and drainage are among the public utilities. It has manufactures of furniture, ironware, malt liquor, and machinery. Population, 1905, 5,435; in 1920, 6,654.

RHINE PROVINCE, or **Rhenish Prussia**, a part of Germany, formerly a province of Prussia. It is bounded on the north by the

Netherlands, east by Westphalia and Hesse-Nassau, south by Lorraine, and west by Luxemburg, Belgium, and the Netherlands. The area is 10,423 square miles, nearly half of which is in a state of cultivation. A large part in the north is low and level, while the south is hilly and undulating. Drainage is principally by the Rhine and the Moselle. Agriculture is the principal occupation, but extensive interests are vested in manufacturing and commerce. Wheat, rye, barley, oats, hops, tobacco, and grapes are the leading products. The extensive vineyards are located along the Rhine and the Moselle, where wine is manufactured extensively for exportation. Coal is mined in large quantities and there is a considerable output of lead, iron, zinc, salt, and copper.

The manufacture of textiles has attained a high state of development, especially in Krefeld and Aix-la-Chapelle. Needles, locomotives, glass, chemicals, leather, paper, sugar, and machinery are produced in large quantities. A network of railways and electric lines furnish transportation to all parts of the province. It has an extensive trade in cereals, wine, textiles, and other manufactures. For the purpose of local government it is divided into the five districts of Coblenz, Cologne, Düsseldorf, Treves, and Aix-la-Chapelle. Coblenz is the capital of the province. The Paris Peace Congress in 1918 ordered that it be occupied by allied troops until Germany would comply with the terms of peace. Population, 1920, 7,120,519.

RHINOCEROS (rî-nôs'ê-rôs), an ungulate mammal, allied to the elephant, tapir, and hippopotamus. Next to the elephant it is the most

marshes and on the banks of streams, where they wallow in the mud, while some frequent open country. Their flesh is eaten by natives and their skin, which is thick enough to be proof against the claws of lions and even bullets, except at the neck and head, is used for whips and shields. One young is brought forth at a time. Little more than mere traces of hair appear on the skin. The hoof terminates in three toes, and one or two horns are attached to the nasal or frontal bone.

The *one-horned*, or Indian, rhinoceros is the largest of the genus. It has a very thick, black horn, which sometimes is two feet long and eighteen inches in circumference at the base, and the skin is peculiar for having definite folds. The *black rhinoceros* is native to South Africa. This species has two horns, the smaller of which grows behind the other, and is dreaded more for its ferocity and strength than the lion. Several species are found in the islands of Java, Sumatra, and Borneo, including the well-known Javanese rhinoceros, all of which are one-horned. The rhinoceroses of Asia are more docile than the African and have been trained as beasts of draft and burden. Traces of many extinct species are found as early as the Miocene tertiary period.

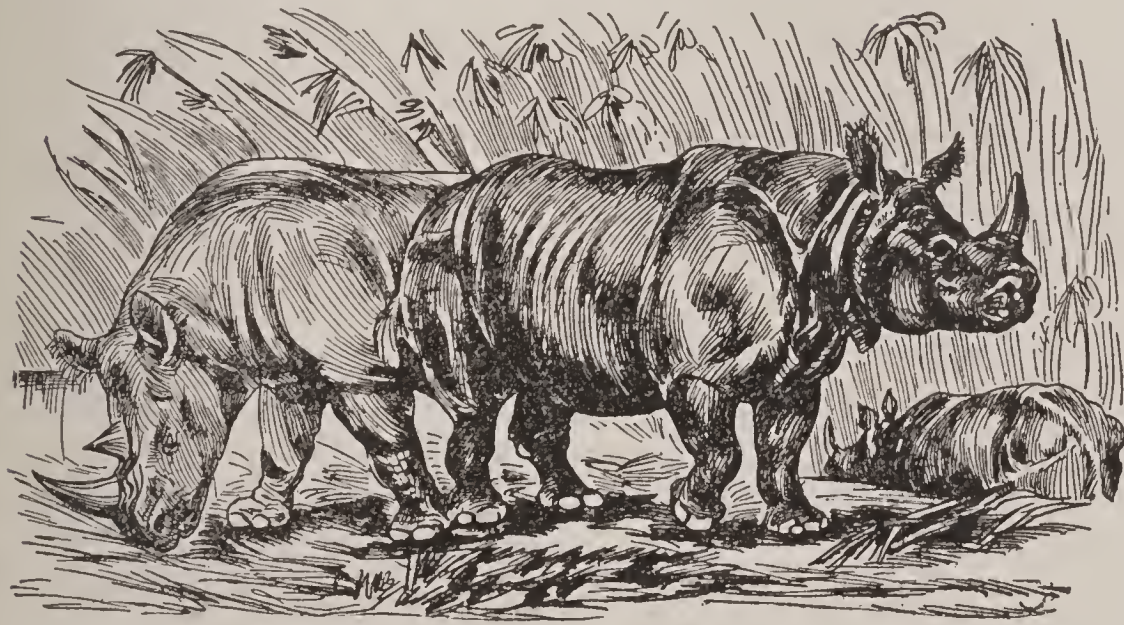
RHODE ISLAND (röd ī'land), one of the original thirteen states of the United States, belonging to the North Atlantic group, popularly called *Little Rhody*. It is bounded on the north and east by Massachusetts, south by the Atlantic, and west by Connecticut. The extreme length from north to south is 49 miles and the greatest breadth from east to west is about 40 miles.

It has an area of 1,250 square miles, of which 97 square miles are water surface. In area it is the smallest State in the Union.

DESCRIPTION. Rhode Island is located entirely in the Atlantic coast plain, but its surface is somewhat diversified, being hilly in the northern part. It slopes toward the south and along the Atlantic coast is a level tract. Durfee Hill, in the northwestern part, has an altitude of 805 feet and is the highest point. The general elevation is less than 600 feet. Narragansett Bay, a large and branching inlet, extends northward from the Atlantic

about 40 miles. Within it are inclosed several islands, including Aquidneck, or Rhode Island, which is three miles wide and fifteen miles long and contains the town of Newport.

The northern part is drained largely into Narragansett Bay by the Blackstone and the Pawtucket rivers. The Ten Mile River forms a part of the eastern border. A small section in the northwestern part is drained by head streams that cross into Connecticut. The Pawcatuck



BLACK RHINOCEROS.

INDIAN RHINOCEROS.

powerful animal now living. A number of species have been described, all of which are native to the warmer parts of Asia and Africa. They are usually harmless and of low intelligence, but display considerable ferocity when provoked, and can run with great speed. The largest are about six feet in height at the shoulders, with short legs and a very heavy and solid body. They feed on grass and other vegetable forms. Most species prefer to loiter in

River drains a large section in the southwestern part, flowing into the Atlantic on the border of Connecticut. Many of the streams are rapid and supply considerable water power. Numerous small lakes are found in many places.

The climate is similar to that of southern Massachusetts and like it is influenced favorably by winds from the Gulf Stream. At Newport, on Aquidneck Island, the mean temperature is 46°. This locality is often referred to as the *Eden of America*, owing to its fine climate, delightful beaches, and bold cliffs. Farther north the extremes of temperature are greater, ranging from about zero in the colder part of winter to 95° in July. All parts of the State have an abundance of rainfall, which averages about 40 inches in the north and 48 inches in the south. All seasons and localities are healthful.

MINING. The minerals are numerous, but the output is not extensive. Deposits of anthracite



RHODE ISLAND.

1, Providence; 2, Pawtucket; 3, Woonsocket; 4, Newport; 5, Westerly. Chief railroads indicated by dotted lines.

coal occur in several sections, but some of the beds are not workable, owing to the fact that they are located near the bay. Extensive beds of granite and limestone abound, the former being quarried largely for monuments and paving blocks, while the larger part of the output of the latter is used in making lime. Magnetite iron ore occurs in several sections. Other minerals

include clays, serpentine, graphite, and talc.

AGRICULTURE. About 67 per cent. of the land surface is included in farms, which average 83 acres. However, only about half of the land is improved. In some sections the soil is of a sandy character, but most of the surface is quite fertile. Hay and forage are the principal crops, but corn, oats, rye, and barley are grown successfully. Considerable gardening is carried on to supply the local market with potatoes, beans, celery, strawberries, and sweet corn. Dairy farming is an important enterprise, yielding large returns from the sale of milk and butter. The cattle grown are of a fine grade and fully two-thirds are milch cows. Other live stock includes horses, sheep, swine and poultry.

MANUFACTURES. A larger number of people are engaged in manufacturing than any other industry and the returns show a steady growth in this enterprise since 1850. Pawtucket and Providence are centers of the cotton-spinning industry, where about two million spindles are employed. The textile products have an annual value of about \$110,500,000 and represent the most important manufactures. They include worsted goods, silk textiles, hosiery, and cotton

and woolen goods. In the output of dyed and finished textiles the State has the third rank in the Union. It holds first rank in the manufacture of jewelry. Other manufactures include firearms, machinery, locomotives, pipe tobacco and cigars, and rubber and leather goods. The fisheries furnish a large output for canning and curing. Large quantities of fruit and vegetables are preserved and canned.

TRANSPORTATION AND COMMERCE. The railroads have a total length of 225 miles and are largely under the control of the New York, New Haven and Hartford Railway Company. Electric lines are operated in the cities and many rural districts, furnishing communications between numerous points within the State. The highways are in a good state of construction and repair. Providence is the most important commercial center and has considerable foreign trade. The principal exports include jewelry and textiles, while the imports embrace lumber, raw cotton and silk, and foodstuffs.

GOVERNMENT. The present constitution was adopted in 1842. It vests the executive authority in the governor, lieutenant governor, secretary, treasurer, and attorney-general, all elected annually on the Tuesday after the first Monday in November. Legislative authority is exercised by the General Assembly, which consists of a senate and a house of representatives. One senator and one or more representatives are elected in each town or city, but no legislative subdivision can have more than one-sixth of the 72 members who constitute the lower branch. The senate has 38 members besides the Governor, who is ex-officio president of that body. A supreme court has ultimate judicial authority, and subject to it are such inferior courts as the Legislature may establish. Local government is administered in the towns and counties.

EDUCATION. The State has a well-organized system of common schools, which are graded from the kindergarten to the public high school. At present illiteracy is placed at 8.4 per cent., but among the native population it is much less. Brown University, one of the oldest institutions of higher learning in the United States, is located at Providence, which is also the seat of the State normal school and the Rhode Island School of Design. Many private and secondary schools are maintained. Kingston is the seat of the Rhode Island College of Agriculture and Mechanic Arts and Bristol has a soldiers' home. Ample provisions have been made for training in the industries and for the care of the unfortunate and incorrigible. Cranston has the State farm, which contains an insane asylum, the reformatory, the workhouse, and the penitentiary.

INHABITANTS. The State has a density of 407 inhabitants to the square mile, which is the largest population per square mile in any of the states. The foreign-born population is 134,519,

including principally Irish, English, and Canadians. Providence, on the Providence River, is the capital and largest city. Other cities and towns include Pawtucket, Woonsocket, Newport, Central Falls, Warwick, Lincoln, Cranston, Cumberland, and Westerly. In 1900 the State had a population of 428,556. This included a colored population of 9,506, of which 366 were Chinese and 9,092 Negroes. Population, 1907, 500,692; in 1920, 604,397.

HISTORY. It is thought that the Norsemen were the first Europeans to visit Rhode Island. They cruised on its shores in the 10th century. Roger Williams was banished from the Massachusetts Bay colony for attacking its theocratic government and in 1636 made the first settlement at Providence, where he advocated complete separation of church and state. The followers of Anne Hutchinson founded Portsmouth in 1638 and Newport was settled in 1639. These settlements were organized as one colony under a charter in 1644, but a new charter was granted in 1663, which remained the fundamental law until 1842. The peculiarity of apportionment of representation and a property qualification for voting caused Dorr's Rebellion in 1842, when a new constitution was adopted, which extended the right of suffrage to all male citizens. The State did not ratify the national Constitution until 1790, this delay being occasioned by a desire of the agricultural classes to reserve the power to levy import taxes and to retain paper money as legal tender. Its citizens were active supporters of the Revolution and all other national contests in favor of maintaining the nation. The property qualification for voting was abolished in 1888 and since 1893 elections to office are by a plurality vote. Formerly Newport and Providence were the joint capitals, but the latter has been the sole capital since 1900.

RHODES (rôdz), an island situated southwest of Asia Minor, in the Mediterranean Sea, belonging to Turkey. The length is about 40 miles; greatest width, 20 miles; and area, 425 square miles. Anciently it was an independent state of Greece, when it was known as Rhodos, and its capital, Rhodes, dates from 404 B. C. It is famous as a maritime city and its neglected harbors were once the seat of vast commercial activity. The city was surrounded by strong walls and at the entrance of one of its ports stood a great statue of Helios, called the *Colossus of Rhodes*. This work of art was so remarkable that it became known as one of the seven wonders of the ancient world. Its height was 70 cubits and it was only one of about 3,000 statues in that city, which was then a noted center of intellectual and political power. Alexander the Great captured Rhodes and established a powerful garrison there, but at his death, in 323 B. C., the Macedonians were expelled from the island. The Rhodians sided with Caesar against Pompey, and in 42 B. C.

Cassius entered the city and carried off many of its treasures. However, it continued to be a center of learning for many centuries under the emperors of Byzantium. The Knights of Saint John of Jerusalem settled on the island in 1310 and until 1565 defended themselves against the Turks, but in the latter year they were compelled to yield. Since then it has been a Turkish possession. The island has a population of about 32,016, of whom fully 25,000 are Greeks.

RHODES, Cecil John, capitalist and statesman, born at Bishops Stortford, England, July 5, 1853; died March 26, 1902. He descended from a noble family and his father was for many years vicar of Saint Michael's Church, in the Bishops Stortford parish. After attending a grammar school he entered Oxford University, and for a time studied law at the London Inner Temple. Soon after he went to South Africa on account of ill health, where he became interested in diamond mining and served in the Cape Colony assembly. He was made Premier of the colony in 1890 and the following year visited England, where he made a donation of \$50,000 to further the Irish Home Rule movement advocated by Parnell. Shortly after he returned to South Africa to take the field against the native King of Matabeleland and in 1896 instigated the notorious Jameson raid into the Transvaal, on account of which he resigned as Prime Minister of Cape Colony. However, he was reelected to the colonial Parliament in 1897, and two years later visited England to plan for a railroad line to ultimately connect Cape Town with Cairo. He is noted as one of the leading British financiers and one of the most influential citizens in promoting the expansion of English influence in South Africa. In the latter part of 1899 he was among those besieged in Kimberley by the Boers, but early in 1900 the city was relieved. See **Rhodes Scholarships**.

RHODESIA (rô-dē'zî-ă), a possession of Great Britain in South Africa, divided by the Zambezi River into Northern and Southern Rhodesia. It is bounded on the north by the Congo Free State and British Central Africa, east by British Central Africa and Portuguese East Africa, south by the Transvaal Colony, and west by German Southwest Africa and Angola. The southern part includes Mashonaland and Matabeleland, two regions lying between the Zambezi and the Limpopo rivers.

Northern Rhodesia has an area of about 288,500 square miles and a population of 846,000. It has fine forests of valuable timber, which yield India rubber and large quantities of lumber. Coal, gold, and copper are mined. Cattle and horses are grown in large numbers by the natives, whose chiefs retain their authority. For the purpose of government it is divided into Northeastern Rhodesia and Northwestern Rhodesia. Administrative headquarters for the for-

mer are maintained at Jameson and for the latter at Livingstone.

Southern Rhodesia has an area of 143,830 square miles and a population of 619,000. It embraces the two provinces of Matabeleland and Mashonaland, the former having a population of 208,700 and the latter 410,000. The soil is generally fertile and the climate is favorable to Europeans. Cereals, tobacco, rubber, cotton, vegetables, and fruits are produced in large quantities. The minerals include gold, silver, copper, iron, lead, coal, and diamonds. About 2,750 miles of railways are in operation, the main line of which forms a part of the Cape-to-Cairo Railway. This line is carried over the Zambezi River at Victoria Falls by one of the highest bridges in the world. Bulawayo is the chief town of Matabeleland and Salisbury of Mashonaland. The inhabitants consist almost exclusively of natives, including about 5,150 whites.

The entire possession of Rhodesia was governed by the British South Africa Company until 1907, when steps were taken to reorganize the government on the principal of federation. Salisbury is the seat of government and the resident of a commissioner and commandant-general. Each division is administered by an administrator, who is assisted by an executive council. Formerly the region was held by the Matabeles, a native race, who concluded an alliance with Great Britain. A royal charter was granted to the British South Africa Company in 1889. Lobengula, the chief of the Matabeles, headed an uprising in 1893, after which the entire region was annexed as a British possession.

RHODES SCHOLARSHIPS, the stipends established by the will of Cecil John Rhodes (q. v.) for the purpose of maintaining a certain number of students at Oxford University, England. It is stated in the will that "a good understanding between England, Germany, and the United States will secure the peace of the world, and that educational relations form the strongest tie." The scholarships were distributed as follows: Australia, 18; Bermuda, 3; Canada, 6; Cape Colony, 12; Germany, 15; Jamaica, 3; Natal, 3; Newfoundland, 3; New Zealand, 3; Rhodesia, 9; and two to each State and Territory of the United States. The beneficiaries are chosen under methods adopted in the several countries, those of Germany being by appointment of the emperor and those of the United States being named by committees in each State and Territory. The age of eligibility is fixed between 19 and 25, and candidates must be unmarried and citizens of the states or countries by which they are appointed. In most cases the committees are presided over by presidents of universities and candidates are chosen on the basis of scholarship. The scholarships have a value of \$1,500 per year and are tenable for three years.

RHODODENDRON (rō-dō-dēn'drōn), an extensive genus of shrubs of the heath family. The leaves are usually alternate and are evergreen in some species, and the flowers are in clusters and often variously colored. Many species are cultivated for ornament in Canada and the United States, where they are found in abundance in the native state along the Pacific coast and in the Allegheny Mountains. Several



RHODODENDRON.

species are native of Japan, China, Australia and South America. Various American species have been naturalized in Europe, where they are cultivated extensively in gardens and parks as flowering plants. Some species abound in the Alps, where they are known among the Germans as *Alpine roses*. The *great rhododendron* is found in abundance in some of the Southern States. It is from ten to twenty feet high.

RHONE (rōn), a river of France, which rises in Switzerland, twenty miles southwest of the source of the Vorder Rhein. The beginning is in the Rhone glacier, about 7,548 feet above sea level. From Lake Geneva, through which it passes, it has a general southwesterly course to Lyons, where it makes a bold turn toward the south and enters the Gulf of Lyons by an extensive delta. The length is 500 miles, the basin has an area of 37,500 square miles, and 350 miles of its course are navigable. The Saône, Ain, Isère and Durance are its principal tributaries. It is connected by canal with the Rhine, Loire, Seine, and Meuse rivers.

RHUBARB (ru'bärb), or **Pie Plant**, a genus of plants cultivated for medicinal use and as a food. About twenty species have been described. The stems are erect and thick, often from five to seven feet high, and bear a cluster of seeds at the upper end. The roots are fleshy and the leafstalks, when young and tender, are used for pies, tarts, preserves, and a kind of wine. In many countries the rhubarb is cultivated chiefly for its roots, owing to their medicinal properties. Rhubarb as a medicine is slightly astringent, when given in small doses, and in large doses acts as a purgative. It is used mostly in treating jaundice, catarrh of the biliary duct, and for certain skin diseases. The plant is cultivated for medicine in China and Russia. In Canada, the United States, and nearly all countries having a temperate climate it is grown for food. The root winters in the

ground in moderately cold climates, hence the young shoots appear early in the spring.

RHYME (rīm), a composition in verse, in which the terminating word or syllable of two or more lines correspond in sound. Poems differ in the degree of resemblance of the endings, but in strict rhyme it is required that the last stress vowels in the rhyming lines agree exactly, although the lines must differ in some respects. The words *rain*, *train* and *strain* rhyme with each other, but *rain* and *reign*, though widely different in spelling, are sufficiently similar in sound to form good rhyme. From this it will be seen that rhyme is governed by the sound instead of by spelling or meaning. In some poems each couplet, or two lines, rhyme, as in Whittier's "Maud Muller":

Maud Muller, on a summer's *day*.
Raked the meadow, sweet with *hay*.

This may be considered a simple style of forming rhymes, and productions written in this form are usually simple and clear in expression. Poems are formed by the writers according to their taste in stanzaic structure, some lines rhyming only at the end and others forming complete rhymes at various intermediate places. Some writers either introduce a limited amount of alliteration or use it extensively. Rhymes at the end of the lines are ordinarily between two or more verses, and sometimes the style is alternated, as in Shelley's "Cloud":

I bring fresh *showers* for the thirsting *flowers*,
From the seas and the *streams*;
I bear light *shade* from the leaves when *laid*
In their noonday *dreams*.

The writers of ancient Greece and Rome did not make extensive use of rhymes, but this style of writing has been popular among the Arabs, Chinese, and other people of Asia from remote antiquity. Systematic rhyme came into use among the Romans in the time of Augustus, in the latter part of the 4th century, and was taken up in Western Europe with much eagerness during the Reformation, when the writing of religious songs formed an important branch of literature. Some of these writers, as Milton, made extensive use of alliteration.

RIBBON (rīb'būn), the name originally applied to an article of ornament, but now employed to designate various products used in binding and tying articles of dress and for symbolical purposes. It is properly a narrow band of woven silk from less than an inch to not more than nine inches in width, but other materials are used extensively for the cheaper grades. The principal ribbons include *satın*, a smooth surface; *grosgrain*, a ribbed surface; and *plush*, a velvety surface. However, there are many varieties of each, differing in composition, weaving, and coloring. Crefeld is the center of ribbon manufacturing of Germany; Vienna, of Austria; Basel, of Switzerland; Saint-Etienne, of France; and Coventry, of

England. The ribbon trade of America and Europe aggregates annually about \$95,000,000.

RIBBON FISH, the name of several fishes found in the deep waters of all the oceans. The body is long and compressed like a tape, while the head is short and the mouth is narrow. On the back is a long and high dorsal fin. The anal fin is absent, while the caudal fin is either absent or but slightly developed. Three families of these fishes have been described, but each is represented by only a few species. The skin is naked and silvery and the entire structure is delicate in nearly all these fishes. Some specimens are from twelve to twenty feet long, but the thickness rarely exceeds two inches. They are not very numerous in any locality, but are found widely distributed from the polar to the tropical seas. A fish common to the Gulf of Mexico and the West Indies is known by the same name, owing to its dark brown bands that characterize the body.

RIBOT (rê-bô'), Théodule Armand, psychologist, born in Guingamp, France, Dec. 18, 1839. He studied at the Lycée de Saint Brieux and at the École Normale, Paris, and received a doctor's degree from the latter in 1875. For a number of years he was professor in the former institution, and in 1885 he was given the chair of experimental psychology at the Sorbonne. Later he was professor of experimental and comparative psychology in the College of France and much of his time was given to the investigation of psychology at the histological and physiological laboratories. He was a leader in developing interest in the study of psychology in France and was the founder of the *Revue philosophique*. Among his publications are "Philosophie de Schopenhauer," "Psychologie des sentiments," "Les maladies de la mémoire," "Les maladies de la volativité," and "Psychologie allemande contemporaine."

RIBS, the elastic arches of bone which constitute the larger part of the walls of the chest. Man has 24 ribs, twelve on each side of the chest. At the back they are attached to the spine. Seven pairs are tied by cartilages to the breast bone or sternum, in front, three are fastened to each other and to the cartilage above, and two are loose, or floating ribs. The first seven pairs are known as *true*, or *vertebro-sternal* ribs, and the others are designated as *false ribs*. The name intercostal spaces is applied to the spaces between the ribs. In respiration the ribs have more or less complex movement. A contraction of the seven upper intercostals causes the sternal end to be elevated and carried forward, causing the diameter of the chest to be increased. The natural form of the chest is that of a cone diminishing upward, which, when the clothing is not too tight, gives the greatest freedom of motion in respiration.

RICARDO (rī-kär'dō), David, economist and statesman, born in London, England, April

19, 1772; died Sept. 11, 1823. He descended from Jewish parents and engaged with his father as a stockbroker. The two became alienated because the son married a Christian and held to the Christian faith, but young Ricardo established himself as a stockbroker, realizing a large fortune by careful devotion to business investments. In 1818 he became a member of Parliament and retained his seat until his death. He was a student of geology, chemistry, and political economy, and published a number of excellent works and made a series of contributions to the *Morning Chronicle*. His most noteworthy publication is "The High Price of Bullion a Proof of the Depreciation of Bank Notes," which appeared in 1809. In this he urged the need of a metallic basis for the national currency. Soon after he completed a work under the title of "The Plan for a National Bank." Other publications are "Principles of Political Economy and Taxation," "Protection to Agriculture," and "Influence of Low Prices of Corn on the Profits of Stock."

RICE, an annual cereal plant native to India, but now extensively naturalized and cultivated for its seed. Many writers assert that rice was



RICE.

cultivated in China about 2822 B. C.; in the Euphrates Valley, about 400 B. C.; and near Pisa, Italy, as early as 468 A. D. It constitutes one of the most important foods and is used more extensively than any other food-stuff by the people of the world, being the principal food of nearly one-third of the human race. Sev-

eral thousand species have been enumerated, all depending somewhat on soil and climate. Some are grown on upland, but most of the rice sold in the market is tilled on marshy or inundated land, as in the swamps of the Carolinas, Louisiana, and Texas, and in the Nile and Niger valleys. The seed is sown like oats or wheat, after which the ground is flooded until it germinates, when the water is drawn off, but it is flooded a second time to kill the weeds, and a third time when about to head. In most regions the height of the plant depends principally upon the depth of the water, as the ear always grows above the surface, and the grain is produced in heads similar to oats. The water is drawn off shortly before the grain ripens and the crop is cut with

reapers and threshed by machines much like oats and wheat.

Each grain of rice is covered with a husk, when the seed comes from the threshing machine, in which condition it is known as *rough rice*, or *paddy*. The husk, or hull, is removed by a huller, the essential part of which consists of heavy millstones that revolve rapidly, but are not close enough together to break the kernels. Several grades of rice result in the process of removing the husk on account of some grains being broken, but all of these are separated and sold as different classes of rice. The plan of cultivation and treatment varies somewhat in different countries, but in all cases moisture and a warm climate are quite essential to the production of the better grades. Asia produces more rice than all the other continents. The average yield is from 30 to 38 bushels per acre. Rice of the finest quality is produced in Georgia and the Carolinas. Land which is well suited for rice culture is worth about \$200 per acre. The fields are not as large as those in which corn and wheat are grown. Rice is chiefly a farinaceous food and contains only about seven per cent. of gluten. It is best for the system when eaten with milk or fatty substances.

RICE, Alice Hegan, author, born in Shelbyville, Ky., Jan. 11, 1870. She was educated at Hampton College, Louisville, and began to write short stories at an early age. In 1902 she married Cale Young Rice (born 1872), an author and dramatist. Her writings are original in humor and the characters are largely real. In 1901 she published "Mrs. Wiggs of the Cabbage Patch," which was read very extensively. Other writings include "Sandy," "Lovey Mary," and "Mr. Opp."

RICE PAPER, a product manufactured from the pith of a plant native to Formosa. It is made extensively in China, whence it is exported in large quantities. Fine artificial flowers are made from this product and it is used to a considerable extent in water color drawings by artists. Several varieties of this paper are used in printing fancy and presentation books.

RICHARD I. (rich'ërd), King of England, surnamed the Lion-Hearted, born at Oxford, England, Sept. 8, 1157; slain March 26, 1199. He was the third son of Henry II. and his queen, Eleanor, and on July 6, 1189, succeeded his father on the throne. During his early life he was the cause of a long quarrel in the family of his father, and in 1184 sided with the King of France in a war against England. Shortly after ascending the English throne, he organ-



ALICE HEGAN RICE.

ized a large army and took part in the third Crusade for the conquest of the Holy Land. His army joined the forces of Philip of France at Vezelai, whence the allied army of 100,000 men marched to Lyons, where they separated, but afterward met at Messina. Richard next sailed to Sicily, then to Cyprus, and on June 4, 1191, joined the Crusaders at Acre. This fortress had been besieged nearly two years, but soon after the arrival of Richard it surrendered, and he immediately began his march upon Jerusalem, but never ventured to make an attack upon the city. He accomplished nothing aside from the capture of Acre, and, after concluding a truce of three years with Saladin, commander of the Saracens, sailed for home, but was wrecked in the Adriatic Sea. Fearing discovery in Austria by his enemy, Duke Leopold, he undertook to pass through that country in disguise, but was discovered and surrendered to Henry VI., Emperor of Germany. He was at length liberated after imprisonment at Trifels and Worms, and in 1194 returned to England. Soon after he engaged in a war against Philip of France, in which he was killed.

RICHARD II., King of England, son of Edward the Black Prince, born at Bordeaux, France, April 13, 1366; died at Langley, Scotland, Feb. 14, 1400. He succeeded his grandfather, Edward III., on the throne of England in 1377. As he was a minor, the government was vested in a council of twelve, but his uncle, John of Gaunt, was excluded from the council. Excessive taxations and various abuses led to a peasants' revolt in 1381, which was headed by Wat Tyler, and in the factional contentions that followed the young king showed considerable boldness and presence of mind.

In 1382 he married Anne of Bohemia, daughter of Emperor Charles IV., and in 1385 ended the war with France only to take up arms against Scotland. He declared his majority in 1389, thus freeing himself from the dictation of the council, but the weak king soon let the reins of government pass to the Duke of York, though the country enjoyed several years of peace and a fair degree of prosperity. However, the queen died in 1394 and he soon after married Isabella of France. In 1397 he became entangled in a quarrel with Warwick, Gloucester, and Arundel, and when Parliament met all were declared guilty of treason. This resulted in the execution of Arundel, while Warwick was banished, and Gloucester died from violence in prison.

On the death of John of Gaunt, in 1399, Richard seized the Lancaster estates, and this unjust act became the occasion of his downfall. While the king was in Ireland, the Duke of Hereford organized a force to regain the Lancaster estates, and succeeded in raising sufficient military power to force the king into submission on his return to England. Parliament, in 1399, deposed him, and on Sept. 29 he executed a deed resigning the crown to Henry. Though at first

liberated, a month later Richard was sentenced to life imprisonment at Pontefract Castle. A conspiracy was discovered in 1400, against Henry IV., in which Richard was implicated, and his death soon after in prison is thought to have resulted from violence.

RICHARD III., King of England, last of the Plantagenet dynasty, born at Fotheringay, England, Oct. 2, 1452; died in battle at Bosworth, Aug. 21, 1485. He was the youngest son of Richard, Duke of York, and a brother of Edward IV. The latter succeeded his father as king of England, in 1460, and soon after created Richard Duke of Gloucester and made him lord high admiral, in which capacity he served the king with much fidelity. He married Anne, daughter of the Earl of Warwick, in 1473, and in 1482 commanded an army into Scotland against James III. Edward IV. died in 1483 and left Richard as guardian to his son Edward V., then a youth of only thirteen years. However, Richard at once began to make plans with the view of acquiring the throne of England, and accordingly placed Edward V. and his younger brother in the Tower, while he had himself proclaimed King of England. The people soon organized a formidable insurrection against him, but he suppressed the uprising and executed the leaders. About the same time the two royal children were cruelly murdered in the Tower, it is thought with the knowledge of Richard. His reign was characterized by much cruelty and crime, which soon disgusted the people, and in 1485 Henry of Richmond landed in England as his rival for the throne. The two met in battle at Bosworth, where Richard was slain. This battle decided the War of the Roses and placed the house of Lancaster in power.

RICHARDSON (rich'ërd-sün), **Henry Hobson**, architect, born in Priestley's Point, La., Sept. 29, 1838; died April 28, 1886. After graduating at Harvard University in 1859, he studied architecture in Paris until 1865, when he returned to the United States and became a member of the firm of Gambrell and Richardson in New York City. Richardson may be said to have originated a particular style of architecture, possessing elements of strength and refinement. It was his disposition to produce effect by mass rather than elaboration of decoration. Among the noteworthy structures planned by him are the Brattle Street Church, Boston; the Trinity Church in the same city, built on the style of the Provençal cathedrals; and a number of halls at Harvard University. He was employed for several years as one of the architects on the State capitol building at Albany, N. Y. Richardson was a man of much intelligence and fascinating manners.

RICHARDSON, Samuel, eminent novelist, born in Derbyshire, England, in 1689; died in London, July 4, 1761. He was the son of a carpenter and at fifteen years went to London

as an apprentice printer, where he later established an office on his own account. He was known from his youth as a fluent letter writer, but he did not engage in literary work until about fifty years old, when he became the discoverer of a new literary form by accident. This occurred when a London firm wished to publish a series of model letters as a guide for letter writers, and he was selected as a suitable person to prepare such a work. However, he conceived the idea of making the letters tell a connected story and selected a country girl to represent the heroine, naming his production "Pamela, or Virtue Rewarded." This work was received with such favor that a large number of editions were issued.

Richardson's second novel, entitled "History of Clarissa Harlowe," appeared in 1749. This work is generally regarded his masterpiece. It is the tragic story of a young lady who falls a victim to a man of splendid talent and attraction, but of infamous character. A few years later he published "History of Sir Charles Grandison," in which he sought to portray the type of a true man, but it is quite evident that he was more successful in the delineation of women than of men. In these three works Richardson treated in an interesting manner as many different orders in the social scale. "Pamela" dealt with the low; "Clarissa Harlowe," with the middle class of society; while in "Sir Charles Grandison" he intended to represent an ideal hero, who would combine the graces and accomplishments of the man of fashion with the perfection of educational and religious culture. In 1754 he became the printer of the journals of the House of Commons. Among his writings not named above is an edition of "Aesop's Fables."

RICHARDSON, William Adams, jurist and statesman, born in Tyngsborough, Mass., Nov. 2, 1821; died in Washington, D. C., Oct. 19, 1896. In 1846 he graduated from Harvard University, where he studied law and was admitted to the bar in Boston. He soon rose as a prominent member of the bar, became judge of probate for Middlesex County in 1856, and in 1869 was appointed Assistant Secretary of the Treasury by President Grant. In 1873 he became Secretary of the Treasury, transferring shortly after the Geneva award of \$15,500,000 from London to Washington, but resigned in 1874 to become judge of the court of claims. President Arthur appointed him chief justice of the court of claims in 1885. He served as trustee of Harvard and lecturer on law in the Georgetown University, D. C. His publications include "The Banking Laws of Massachusetts," "History of the Court of Claims," and "National Banking Laws."

RICHELIEU (rēsh'ē-lōō), **Armand Jean du Plessis, Cardinal, Duke of**, eminent statesman, born in Paris, France, Sept. 5, 1585; died Dec. 4, 1642. He descended from a

noble family and studied for a military career at the College of Navarre, but his elder brother, being bishop of Luçon, influenced him to study for the church. Accordingly he attained a degree at the Sorbonne and in 1607 succeeded his brother as bishop of Luçon, being consecrated to that position by Cardinal de Givry in the presence of Pope Paul V. Louis XIII. of France appointed him secretary of war and foreign affairs in 1616, but the following year Louis quarreled with the queen mother and Richelieu was banished to Blois and later to Avignon. A reconciliation was effected soon after and the queen was restored to her position at court, Richelieu gaining marked influence. He was made cardinal in 1622 and became minister of state in 1624, a position which he retained until his death. It was Richelieu's design to strengthen the French court and with that end in view he devised a plan whereby the nobles and feudal lords were limited in power, many of the leading opponents being sentenced to life imprisonment or brought to the scaffold. This fairly begun, he began to plan with the view of weakening the house of Hapsburg, both in Germany and Italy.



CARDINAL RICHELIEU.

He was instrumental in bringing Gustavus Adolphus into Germany as a champion of the Protestants in the Thirty Years' War, but only because he designed to humble the pride of Austria. Immediately after he undertook to suppress the Huguenots, which he accomplished in part in 1628 by capturing La Rochelle. When their influence became limited, he turned against the queen mother, Mary of Medici, for the reason that she had conspired to cause his fall, whereupon she was compelled to withdraw into exile at Cologne. Richelieu was signally successful in carrying out his vigorous policy, both at home and abroad. He made his administration quite impressive by establishing many internal improvements and promoting gigantic military maneuvers. As a statesman he attained to much eminence, giving the royal house freedom from the influence of the nobility. He patronized learning and is the founder of the French Academy and the Royal Printing Presses. In 1631 he was raised to the rank of duke. He is the author of several works on economics, civics, and diplomacy.

RICHMOND (rich'münd), a city of Indiana, county seat of Wayne County, on the White-water River, 68 miles east of Indianapolis. It is on the Grand Rapids and Indiana, the Pittsburgh, Cincinnati, Chicago and Saint Louis, the Chicago, Cincinnati and Louisville, and other

railroads. The surrounding country is a rich farming and dairying district. The principal buildings include the county courthouse, the Morrison-Reeves Public Library, the Richmond Law Library, the Earlham College (Orthodox Friends), the Saint Stephen's Hospital, and the Eastern Indiana Hospital for the Insane. It has a fine city hall, a large high school, and Glen Miller Park. Among the manufactures are flour, engines, boilers, farming implements, earthenware and furniture. The city has electric street railways, brick and macadam pavements, and systems of waterworks and sanitary sewerage. It was settled in 1816 and incorporated in 1840. Population, 1920, 26,728.

RICHMOND, the largest city of Virginia, capitol of the State and county seat of Henrico County, 115 miles southwest of Washington, D. C. It is situated on the James River, about 125 miles from the Atlantic Ocean, and is reached from coast ports by steamship lines. The river has extensive rapids, which pass over a fall of 100 feet in six miles, hence furnish vast water power. Railway communication is provided by the Southern, the Chesapeake and Ohio, the Seaboard Air Line, the Atlantic Coast Line, the Norfolk and Western, and other railways. Intercommunication is facilitated by an extensive electric system, which has branches to Seven Pines and other interurban points. The James River is spanned by several bridges, connecting with Manchester and other suburbs.

DESCRIPTION. Richmond is located on a beautiful site of gently rolling ground, including an area of about sixteen square miles. The site rises in terraces from the James and varies in altitude from 150 to 250 feet above sea level. The older part of the city is near the river, and the newer portion is toward the higher sections in the north and northwest, where a large residential district is located. The homes generally are well built and beautified by lawns and avenues of trees and shrubbery. All of the streets are platted on a regular plan, crossing each other at right angles, and many are improved by pavements of stone, asphalt, and macadam.

Capitol Square, a tract of twelve acres, occupies the central part of Shockoe Hill and is a place of historic interest. It is situated in the heart of the city and contains the State capitol, completed in 1796. It is modeled after the *Maison Carrée*, Nîmes, France. The plans were sent from that country by Thomas Jefferson and are still preserved in the State library of Virginia. In the capitol are portraits and busts of eminent men, and in the rotunda is the celebrated marble statue of Washington by Houdon, the French sculptor. Upon the grounds are the Governor's mansion, the State library building, the life-size marble statue of Henry Clay, and the bronze statues of Governor Smith, Stonewall Jackson, and Hunter McGuire. An equestrian statue of Wash-

ington, by Crawford, near the west gate of Capitol Square, is considered one of the finest bronze works of art in America. Surrounding the base are bronze figures of George Mason, John Marshall, Andrew Lewis, Patrick Henry, Thomas Jefferson, and Thomas Nelson.

BUILDINGS AND MEMORIALS. The city hall, a handsome structure of granite, faces Capitol Square on the north and near it is the Saint Paul's Church. The post office, the chamber of commerce, the soldier's home, the State penitentiary, the Masonic Temple, the Valentine Museum, and the Union railway station are other structures of note. Foremost among the historic buildings is Saint John's Church, in which Patrick Henry delivered his famous address, closing with the words "Give me liberty, or give me death." The residence of Jefferson Davis, now used as a Confederate museum; the residence of General Lee, now occupied by the State Historical Society; and the home of Chief Justice Marshall are of historical interest. The Confederate soldiers' and sailors' monument is on Libby Hill, or Marshall Park, and near it is the site of the famous Libby Prison. On Monument Avenue are a statue of J. E. B. Stuart, the defender of Richmond; an equestrian monument of Lee; and the famous monument of Davis, containing a balcony in which the Confederate States are represented. Monroe Park has a statue of General Wickham. Gamble's Hill Park affords a splendid view of the river and the historic Belle Isle. Hollywood Cemetery, the finest in the city, contains the graves of Jefferson Davis, John Tyler, James Monroe, J. E. B. Stuart, John Randolph of Roanoke, and 18,000 Confederate soldiers, whose memory is honored by a pyramidal monument of granite.

EDUCATIONAL AND OTHER INSTITUTIONS. Richmond is noted as a center of art and education. It is the seat of Richmond College, the Medical College of Virginia, the Union Theological Seminary, the University College of Medicine, the Hartshorn Memorial College for Girls, the Richmond Female Seminary, and the Virginia Mechanics' Institute. It has normal schools for white and colored students. Besides the State library with 100,000 volumes, it contains the Rosemary Public Library and the State Law Library. The Lee Camp Soldiers' Home, the Old Dominion Hospital, and the Saint Joseph's Orphan Asylum are among the benevolent and charitable institutions.

INDUSTRIES. In commerce and manufacturing industries Richmond occupies a place of eminence. It is the seat of one of the largest locomotive works in the Union, and has superior advantages for an extensive wholesale and jobbing trade. The manufacture of pipe tobacco and cigars is an extensive enterprise and as a tobacco market it ranks among the leading centers. Other manufactures include paper, baking powder, furniture, hardware,

clothing, carriages and wagons, fertilizers, flour, and farming implements. Large interests are vested in manufacturing brick and tile. The streets are lighted with gas and electricity. Extensive systems of sewerage and waterworks are maintained.

HISTORY. Captain John Smith bought a tract of land from the Indians in 1609 and founded a settlement near the site of Richmond. Fort Charles was built in the vicinity in 1645. The name was changed to Richmond in 1733, when the town was platted, and it was incorporated in 1742. In 1775 it was the place of meeting for the famous assembly in which Patrick Henry took a leading part. It was made the capital of Virginia in 1739, when it was only a small village. Here was ratified the Federal Constitution in 1778, and in 1799 the celebrated Virginia Resolutions were passed. Richmond was made the capital of the Confederate states in 1862, which it continued to be until 1865. During the Civil War it was the objective point of the Federal armies in the East and in its vicinity were fought a large number of pitched battles and skirmishes. The Confederate forces evacuated the city on April 2, 1865, when the warehouses were set on fire by order of General Ewell. Subsequent to the war it was rebuilt rapidly and has since continued to increase in wealth and population. Population, 1908, 115,844; in 1920, 171,667.

RICHMOND, Leigh, clergyman and author, born in Liverpool, England, Jan. 29, 1772; died May 8, 1827. He was the son of a physician, graduated from Cambridge in 1794, and soon after became curate of Brading in the Isle of Wight. Later he secured an appointment as chaplain to the Locke Hospital in London, but in 1805 became rector of Turvey, Bedfordshire, a position he held until his death. Richmond is noted as a prominent supporter of the British and Foreign Bible Society and as the author of "The Dairyman's Daughter," a work translated into twenty different languages. Other writings are "Young Cottager" and "Negro Servant." In 1814 his writings were collected and published under the title of "Annals of the Poor."

RICHTER (rik'tēr), **Eugene**, statesman, born in Düsseldorf, Germany, July 30, 1838; died March 10, 1906. He studied at Bonn and Berlin and became identified with the liberal party. In 1867 he was elected to the Prussian house of deputies and two years later became a member of the Imperial Diet, where he attained to leadership of the progressives. He opposed the state control of railroads, the protective tariff, and the colonial policy of the government, hence was an opponent of Bismarck on many occasions. Besides being authority on financial questions, he is the author of many works of a political nature. His books include "Political A, B, C Book," "The Future of Social-Democracy," "Recollections of the Reich-

stag," and "Errors of the Social Democratic Party."

RICHTER, Hans, German musician, born in Raab, Hungary, April 4, 1843. His father held an important position in the cathedral of Raab at the time young Richter was born. He entered the Conservatorium in Vienna in 1859, where he played the horn in the orchestra of the Kärnthnerthor Opera. He was made conductor of the National Theater in Munich in 1868, of the National Theater at Pesth in 1871, and of the Court Opera Theater in Vienna in 1875, which position he held until 1898. In the last mentioned year he became conductor of the Manchester Philharmonic Society. Richter played in many of the leading cities of Europe and may be considered one of the most eminent orchestra conductors of the early part of the 20th century. He is the most eminent authority on Wagner and Beethoven of recent times. He died Dec. 6, 1916.

RICHTER, Johann Paul Friedrich, usually called Jean Paul, noted author, born in Wunsiedel, near Baireuth, Germany, March 21, 1763; died Nov. 24, 1825. His father was a school-teacher and died while the son was attending the gymnasium at Hof. He entered the University of Leipzig in 1780 to study theology, but there became deeply interested in literature and sciences. Poverty caused him to leave the university in 1784, when he returned to live with



JEAN PAUL RICHTER.

his widowed mother at Hof, and engaged as private tutor to teach the children of several wealthy families. In the meantime he published his first composition, "The Praise of Folly," but his writings were not favorably received until 1793, when he published "The Invisible Lodge," a romance relating to experiences in the life of a school-teacher. From that time his success was assured and his books became the most widely read in Germany.

In 1801 Richter married Caroline Mayer, daughter of Professor Mayer of Berlin, and the two spent some years in travel, visiting Goethe, Schiller, Wieland, and Gleim. He settled at Baireuth, in Bavaria, in 1804, where his time was spent in great industry and marked domestic happiness. In his later years he became afflicted with total blindness and the death of his son, Max, in 1821, weighed heavily upon him. Richter is the author of a number of works written in a deeply reflective style, but in many of them he mingled rare humor, and was able to describe scenes from nature with remarkable accuracy and ease. Few writers are more really poetic in their prose writing, and none outrank him in originality and interest.

Among his writings not named above are "Hesperus," "Flower, Fruit and Thorn," "Dream of the Dead Christ," "Parson in Jubilee," "Biographical Recreations Under the Cranium of a Giantess," "Titan," "Wild Oats" (*Flegel Jahre*), "Life of Quintus Fixlein," "Levana, or Rules of Culture," and "Rules of Aesthetics."

RICKETTS, James Brewerton, soldier, born in New York City, June 21, 1817; died in Washington, D. C., Sept. 22, 1887. After graduating from the West Point Military Academy in 1839, he served on the frontiers and at the beginning of the Mexican War accompanied the American army, serving in several important battles. He was made brigadier general of volunteers in 1861. He served with the army of the Potomac until the surrender of Lee and took part in the battles of Bull Run, South Mountain, Antietam, and the Wilderness, and the siege of Petersburg. In 1867 he retired from the army with the rank of major general. He served on courts-martial from that time until January, 1869.

RIDDER, Herman, journalist, born in New York, N. Y., March 5, 1851. He studied in the public schools and engaged in the insurance business. In 1878 he established the *Catholic Volksblatt*, a journal devoted to general and religious news, and in 1886 founded the *Catholic News*. He became manager of the New York *Staats-Zeitung* in 1890, and was made president of the same in 1907. In the meantime he developed much influence in politics. In 1908 he was chosen treasurer of the Democratic national campaign committee. He died Nov. 1, 1915.

RIDDLE (rĭd'd'l), a proposition or question put in obscure terms to excite curiosity and exercise the ingenuity in discovering its meaning. Riddles may be regarded fables put in the form of questions, and like them they originated with primitive people. They have been perpetuated in the folklore of the peasants. In ancient times fables were used to enhance investigation and to exercise at least some degree of influence in disciplining the mind. This is illustrated by the mythology of Greece and many of the sacred writings, of which the riddles proposed by Samson to the Philistines and those attributed by Josephus to Solomon are good examples. In the Middle Ages there was a marked disposition to construct and propound riddles as a pastime or for intellectual exercise, but the practice was limited greatly by the Reformation and has now gone entirely out of use in the more highly civilized countries. A tendency to use riddle making as a merry pastime still prevails in some of the countries of Western Asia. Many books on riddles have been published, the most noted collection being the German work issued in 1883, known as Ohnesorgen's "Sphinx." An example quoted here will, perhaps, serve as an illustration, namely: "What is the worst bestowed charity one can give?" Answer: "Alms to a blind man;

for he would be glad to see the person hanged who gave it to him."

RIDEAU (rĕ-dō'), a river of Ontario, which rises in Lake Rideau and, after a course of about sixty miles toward the northeast, flows into the Ottawa River at the City of Ottawa. It is important as a link in the Rideau Canal, which was completed in 1834. This waterway extends from the city of Ottawa to Kingston, on the Bay of Quinte, an inlet from Lake Ontario. It utilizes the Rideau River and Rideau Lake, and extends toward the southwest by way of Mud Lake and the Cataraqui River. The canal has 47 locks, is 127 miles long, and has a depth of about five feet. Formerly it was of much importance, but it is now little used, owing to the construction of railways and other canals.

RIDGWAY (rĭj'wā), **Robert**, ornithologist, born in Mount Carmel, Ill., July 2, 1850. He attended the public schools of Illinois, and later was appointed zoölogist on the United States geological exploration of the fortieth parallel in 1867-69, under Clarence King. In 1877 he published a section on ornithology in the government report of the expedition, which was based on his collection of information regarding reptiles, fishes, and birds observed between Sacramento and Salt Lake City. In 1880 he became curator in the United States National Museum at Washington, and for some time was president of the American Ornithologists' Union. His writings embrace several hundred books and reports, of which "Birds of North and Middle America," in eight volumes, is the most important. Other publications are "A History of North American Birds," "Manual of North American Birds," "Water Birds of North America," "Nomenclature of Colors for Naturalists," and "Report on Ornithology of the Fortieth Parallel."

RIDING, the art of training domestic animals, especially horses to fit them to be ridden for pleasure and for traveling. Horsemanship was first developed upon a high plane in the Orient, especially in Arabia and Persia, where the horse has been highly esteemed from remote antiquity. The Arabian steeds were noted for their agility and endurance throughout the historical period. The long stretches of pastoral lands made the horse of especial value in traveling rapidly for long distances, while the camel served more particularly for extended tours through the desert. Horsemanship was a highly developed art among the Grecians, who employed the horse in festivals and for riding, and it was afterward introduced into Rome and the countries of Western Europe. Riding continued to be a favorite mode of traveling until modern times, when it was replaced largely by the use of steam and electricity. However, it continues to be a wholesome athletic pastime, in which the principal muscles of the body are called into active play and the organic functions are greatly stimulated. Although riding is limited to short

trips in North America, it still continues to be an important factor in the sports and athletic exercises of Europe.

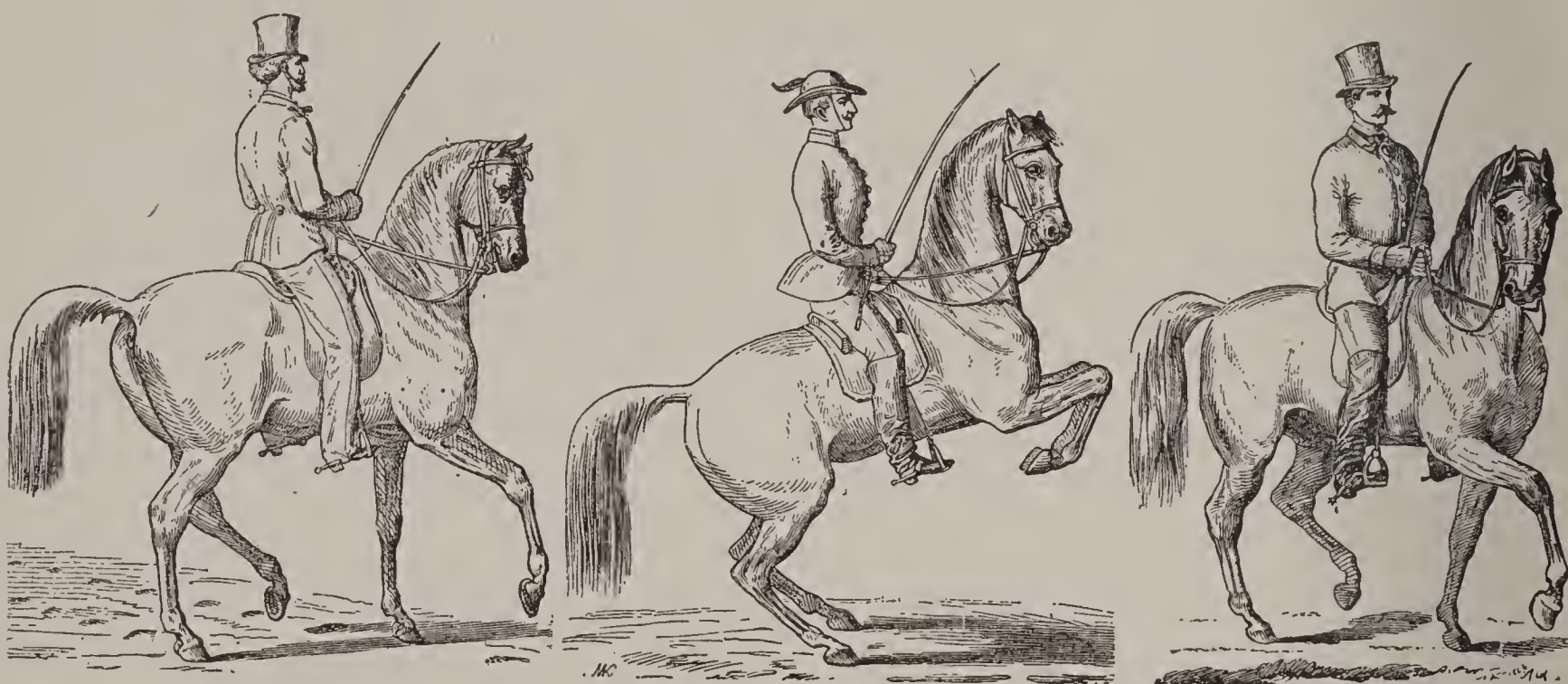
Horses have three natural paces, known as *walking*, *trotting* and *galloping*, but they may be quickened and beautified by training. The head should be held backward in a graceful position by the reins, the step should be shortened, and the animal should be trained to move with spirit. An upright position should be assumed by the rider, who should be provided with spurs and a short riding whip. The saddle should be well fitted to the horse and the stirrups need to be adjusted to the requirement of the rider. Considerable practice is needed to accustom the body to the natural position of riding, but this is soon acquired by those who exercise the art daily or several times per week. See **Horse; Race**.

RIDLEY (rĭd'li), **Nicholas**, noted leader of the Reformation, born at Unthank, Northum-

berland, England, about 1500; suffered martyrdom Oct. 16, 1555. After attending the grammar school of Newcastle-upon-Tyne he entered Cambridge University, where he was ordained priest in 1524. The spirit of the Reformation had already spread in various parts of England, but he was more forcibly imbued with the new doctrines by spending three years in France, after which he returned to England and arduously taught the reformed faith. In 1530 he became undertreasurer of Cambridge University, and shortly after signed the decree of that institution against papal jurisdiction in England. He was appointed king's chaplain in 1540, elected master of Pembroke College, Cambridge, the same year, and in 1545 became a canon of Westminster. In 1552 he visited Princess Mary at Hunsdon, but, failing to persuade her to leave the Catholic faith, he concurred in the proposals to exclude her from the throne, giving his support to Lady Jane Grey instead. Soon after the

death of Edward VI. he delivered a sermon at Saint Paul's Cross in opposition to Mary, declaring her illegitimate and predicting her ascension detrimental to England. He was arrested shortly after in accordance with the proclamation issued by Mary and committed to the Tower. Cardinal Pole named a commission to try Ridley for heresy, and in March, 1554, he was found guilty and sentenced to death. Efforts were made to cause him to recant, but he remained steadfast and along with Latimer was burned at the stake in Oxford.

RIDPATH (rĭd'pāth), **John Clark**, educator and author, born in Putnam County, Indiana, April 26, 1840; died in New York City, Sept. 30, 1900. He first attended the common schools, but in 1859 entered De Pauw University, from which he graduated with honors. After serving as principal of the Thorntown Academy, he became professor in Baker University, Kansas, in 1867, and in 1869 was called to the chair of



POSITIONS AND MOVEMENTS IN RIDING ON HORSEBACK.

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English literature in De Pauw University. Later he became professor of history and political philosophy, and in 1879 was made vice president of the institution. During this period he succeeded in raising the university endowment to \$2,000,000 and in 1885 resigned to devote his whole time to literature. His first book appeared in 1875, entitled "Academic History of the United States," and the following year he published his "Popular History of the United States." He contributed to many magazines, and was for a time editor of the *Arena*, of Boston. In 1896 he was a candidate for Congress on the Democratic ticket in his home district in Indiana, but was defeated by a small majority. "Great Races of Mankind" is one of his leading works, on which he was engaged for ten years in preparing the material and four years in writing the work. Other publications include "Life and Work of Garfield," "Life and Times of Gladstone," "Life and Work of James G.

Blaine," "History of all Nations," and "Cyclopaedia of Universal History." He edited "The Ridpath Library of Universal Literature."

RIEL (rê-ël'), **Louis**, public man, born at Saint Boniface, Manitoba, Oct. 23, 1844; died Nov. 16, 1885. He descended from French and Indian parentage, was educated for the priesthood in the Roman Catholic Seminary at Quebec, but did not take orders in the church. In 1869 he became the leader of the Red River Rebellion, which broke out after the Northwest Territory was purchased by the Canadian government from the Hudson's Bay Company. The settlers at that time numbered about 12,000 and they considered themselves ignored in the reorganization of civil affairs. The malcontents organized a provincial government and took possession of Fort Gary, now Winnipeg, but Colonel Wolseley was sent to the seat of trouble with a force of 1,440 men in 1870. Riel fled to the United States, but returned to his native country soon after, where he was elected to the Dominion Parliament in 1873 and again in 1874 for the district of Provencher. He attempted to take his seat, but was expelled. In 1878 he formed a conspiracy with the Fenians to conquer the northwest, and in 1884 became president of a provisional government that had been established at Saint Laurent, near the Saskatchewan River. General Middleton was sent to capture the headquarters at Batoche. Riel was soon captured and convicted of high treason at a trial in Regina, where he was condemned to death and hanged.

RIENZI (rê-ën'zè), **Cola di**, eminent statesman, born in Rome, Italy, in 1313; died Oct. 8, 1354. He descended from humble parents, but was endowed by nature with remarkable power of oratory, and secured the advantages of a liberal education, including instruction in rhetoric, history, philosophy, and poetry. His ambition to free Rome from the thralldom of the nobles was first excited when his younger brother was assassinated by a Roman nobleman, and he was even more aroused because punishment of the offender was impossible. In 1343 he joined Petrarch and visited the court of Pope Clement VI, at Avignon, where he described the tyranny of the nobles in a remarkable oration. It was through the effort of Petrarch that Rienzi was given a favorable hearing, and subsequently he received an appointment as notary to the chamber of Rome. For three years he advocated reform without avail, but in 1347 he took advantage of the governor's absence from the capital and successfully planned a revolution.

Rienzi, as a means to form a concerted movement, held an assembly of his friends on Mount Aventine, where he proposed a plan of government that he called the *Good Estate*, and induced them to subscribe an oath in support of it. With a hundred horsemen and the support of the Pope's legate he made his way to the capitol, where the title of tribune was conferred up-

on him by the people. The common people having attained an easy triumph, he banished a number of the nobles from Rome, and amid great rejoicings the proclamation went forth that the Eternal City would again revive its former glory and power. At first successful, he was confirmed in authority by the Pope, but the powerful nobles still opposed him bitterly, while the necessary taxes for the support of the government excited opposition among the common classes.

In 1348 Rienzi was compelled to withdraw from Rome after a reign of seven months. He fled to Naples and afterward spent several years with the Franciscans in the Apennines. He ventured a second time to attempt the deliverance of Rome by applying, in 1350, to Charles IV., Emperor of Germany, for assistance, but that sovereign was unfavorably impressed with his schemes of revolution and delivered him to Pope Clement as a prisoner, who held him captive for three years. Innocent VI. not only released him, but decided to assist Rienzi in crushing the Roman nobles, hoping thereby to rid himself of a demagogue named Boroncelli. Rienzi immediately raised a large body of soldiers and made a triumphal entry into Rome, where much rejoicing was occasioned by his return. However, the barons opposed him by fortifying themselves in their castles, and he abandoned public concern for good living. His administration was attended by many disturbances and after a rule of two months he was attacked at the capitol by a crowd of people and was put to death under great indignities.

RIESENGBIRGE (rē'zen-ġe-bērg'ē), or **Giant Mountains**, a mountain group of Europe, situated between the upper courses of the Elbe and Oder. It forms the boundary between Germany and Bohemia. The range covers an area of 425 square miles, most of which is in Austria. Schneekoppe is the culminating peak and the loftiest mountain in southeastern Germany, having a height of 5,260 feet. Iron, granite, and metamorphic slate are abundant in these mountains.

RIETSCHHEL (rēch'el), **Ernest**, sculptor, born at Pulsnitz, Germany, Dec. 15, 1804; died Feb. 21, 1861. He studied art at the Dresden Academy, where he was awarded several prizes for his drawings, and afterward was a pupil of Rauch in Berlin. The government of Saxony granted him a stipend in 1827 and subsequently he traveled and studied art in Italy. He was made professor at the Dresden Academy in 1832, which position he held until his death. As a sculptor he holds a very high place among the artists of Europe and he is the founder of the Dresden School of Plastic Art. He executed busts of Luther and Rauch, statues of Dürer, Goethe, and Holbein, and celebrated monuments of many prominent men. The last mentioned include the monument of Luther at Worms and the Goethe-Schiller monument in Weimar.

Among his other works are "The Christ Angel," "The Muse of Music," and "An Epoch of Civilization."

RIFLE (rī'f'l), the name of any firearm that has grooves in the surface of the bore, but usually the name is applied only to the arm that has superseded the musket. The firearms that were made originally for hand use consisted of long tubes without any lock, and were fired by means of a slow match or a live coal. They were at first laid on a wall or wooden frame, but later a handle was added for holding them up against the arm or shoulder. It was found soon after that the smooth bore in the barrel is not conducive to good results, since not only a part of the explosive force of the powder is lost, but there is a downward pressure in the barrel which tends to cause the ball to move forward in a direction different from that indicated by the barrel. Hence, a barrel with a smooth bore does not make it possible to shoot with accuracy at any great distance.

The first material improvement was made in the 15th century by providing these weapons with straight grooves, but in 1520 Augustus Koster, of Nuremberg, Germany, found by experimenting that a spiral groove imparts rotation to the projectile and increases the accuracy of the weapon. Since then the barrels have been rifled in that manner, the number of grooves and twist of the spiral varying according to the intended use. The rapidity with which the bullet revolves depends entirely upon the character of the twist in the spiral and the force of the explosion, but the most important effect of the revolution is to cause the ball to move forward in a line with the barrel. In this the ball is subject only to the force of gravity, by which it is eventually brought to the ground.

It is to be observed that there is a difference between the balls formerly used and those now generally employed, in that the former were round, while the latter are elongated. Balls of the elongated type first came into use in 1851 and are the invention of Captain Minié of the French army, who is the inventor of the *Minié rifle*. The bullets first used by him had a hollow base, and the explosion of the powder caused them to expand and take on a form at the surface resembling the inner mold of the gun. There was some advantages in this particular gun, but its heavy weight caused it to be discarded for the *Enfield rifle* in 1853. This rifle was lightened materially by reducing the bore to .58 of an inch in diameter. The Enfield rifle was used in the British army until 1865, when it was converted into a breech-loading firearm by attaching to it a breech-loading mechanism. The United States adopted the *Springfield rifle*, a firearm with a caliber of .58 inches, in 1855, which was used to a considerable extent throughout the Civil War, though a large number of Enfield rifles were employed. A short time before the Franco-German War of 1870-71

the German army was supplied with the celebrated *needle rifle*, which was the first arm of this kind to acquire a reputation in warfare. It proved an efficient aid in the military contest so detrimental to France.

Rifles used at present by the leading nations are not only grooved spirally, but are breech-loading and repeating. Though the repeating rifle is not new, it has been improved within recent years. The *Spencer rifle* was among the first of the repeating kind and has a supply of cartridges in the stock of the arm, while the *Winchester rifle* has a tube under the barrel. All the newer rifles designed for rapid firing have a quantity of cartridges in a detachable magazine, which may be replaced as soon as emptied by one filled with a new supply of cartridges. The German *Mauser-Mannlicher rifle* is a typical repeater of modern make. The cartridges are issued in packages of five and are placed in a tin or sheet-iron loading case. A magazine immediately in front of the trigger receives the case through an opening. When adjusted, the top cartridge is in position to be pushed into the chamber of the gun by a forward motion of a bolt. A spring presses and holds the case in position as long as any cartridges remain, but, when the last cartridge is pushed out by the bolt, the case drops through by its own weight and is then replaced by another. Other modern rifles are made somewhat differently, but in effect they produce practically the same results.

The United States adopted the *Krag-Jorgensen rifle*, an implement of German manufacture, in 1896, which was superseded in 1904 by a newer pattern of the *Springfield rifle*. With the standard pattern of this firearm it is possible to dispatch 45 shots per minute, the ball traveling at the rate of 2,310 feet per second when it leaves the muzzle and speeding a distance of fully 4,560 yards. The *Mauser-Mannlicher* is used in Germany; the *Lee-Netford*, in England; the *Mannlicher*, in Austria and Holland; the *Mauser* in Belgium, Spain, and Sweden; the *Lebel*, in France and Turkey; the *Mausin*, in Russia; and the *Schmidt*, in Switzerland. Rifles employed in warfare have a much longer barrel than those used for sporting, since long range and powerful penetration are not desired for shooting game.

RIGA (rē'gà), a seaport of Europe, capital of the government of Livonia, on the Duna River, six miles from the Gulf of Kiga. It is connected with other trade emporiums by railroads, has well-paved streets, and is the seat of an excellent cathedral. The streets are broad, except in the older part, and all are lighted by gas and electricity. It has an extensive system of rapid transit and numerous monuments and parks. The noteworthy buildings include the commercial exchange, the Church of St. Peter, the governor's residence, the public library, the seminary for priests, and the central railroad stations. Among the manufactures are cotton and

woolen goods, leather, soap, starch, machinery, pottery, and tobacco products. It has a large trade in lumber, cereals, and live stock. Riga was founded in 1201 and was long an important member of the Hanseatic League. It was annexed to Poland in 1561, but became a Swedish possession in 1621 under Gustavus Adolphus. Since 1710 it has been a part of Livonia. The Germans bombarded it successively and finally captured it without resistance in 1917. Population, 1914, 388,385.

RIGA, Gulf of, an inlet from the Baltic Sea, in the western part of Russia. It is about 100 miles long and 65 miles wide. At its entrance is the island of Oesel. It receives the water of the Düna River.

RIGGS, Elias, missionary, born in New Providence, N. J., Nov. 19, 1810; died Jan. 20, 1901. He graduated from Amherst College in 1829, attended Andover Seminary, and in 1832 went as a missionary to Athens, Greece, under the American Board of Missions. After several years of successful work in the vicinity of Athens, he located in Smyrna, Asia Minor, and in 1853 was transferred to Constantinople. In the meantime he aided in revising the translation of the Bible into the Bulgarian and Turkish languages, and in 1857 came to New York to publish his own translation of the Bible into the Armenian language. While in America he lectured in the Union Theological Seminary, but soon returned to his field of labor in Asia. His published works include "Grammar of the Modern Armenian Language," "Manual of the Chaldee Language," "Grammar of the Bulgarian Language," "Bulgarian Bible Dictionary," and "Grammar of the Turkish Language."

RIGGS, Kate Douglas Wiggin, author, born at Philadelphia, Pa., Sept. 28, 1857. She studied at Abbott Academy in Andover, Mass., and removed to California. In Los Angeles she studied kindergarten methods and organized the first free kindergartens for poor children on the Pacific coast. In 1895 she married George C. Riggs, but continued to use the name of Kate Douglas Wiggin in her literary work. Her chief books include "Froebel's Gifts," "Nine Love Songs and a Carol," "A Summer in a Cañon," "The Birds' Christmas Carol," "The Story of Patsy," "Rebecca of Sunnybrook Farm," and "Rose o' the River."

RIGGS, Stephen Return, missionary, born in Steubenville, Ohio, March 23, 1812; died Aug. 24, 1883. He labored for many years under the direction of the American Board of Missions, particularly among the Dakota Indians. In 1862 he was compelled to withdraw to Fort Snelling on account of the Sioux War, and became chaplain in the expedition sent by the government against its Indians soon after. Beloit College conferred a divinity degree upon him in 1872. Besides aiding in translating the Bible into the language of the Dakotas, he published "Grammar and Dictionary of the Dakota Language."

RIGHT OF WAY, the privilege to pass over land belonging to another, either permanently or for a brief time, according to the nature of the easement. A right of way is said to be *private* when it is enjoined by a certain person or class of persons, while one that is open for general use is termed a *public* right of way. A highway is a public right of way, while a road reserved for special use is a private right of way. Tracts of land occupied by electric and railway lines may be classed with private rights of way, since the ownership is vested in a particular person or company, although they are used for conveying goods and persons by particular modes. A right of way may be established by an act of legislation, or by the owner dedicating a tract of land to the public.

RIGI (rē'gē), or **Righi**, a noted mountain of Switzerland, located between Lakes Zug and Lucerne, in the canton of Schwyz. It is 5,910 feet high and is one of the most scenic and beautiful peaks of Switzerland. The summit is reached by two rack-and-pinion railways.

RIIS (rēs), **Jacob August**, journalist and author, born at Ribe, Denmark, May 3, 1849. He studied in his native country, but came to America at the age of twenty. After working in New York City as a carpenter and cabinetmaker, he engaged as police reporter for the *New York Sun*. While working in that capacity he took an active interest in promoting tenement house and school reform, and gave aid to the movement which resulted in establishing small parks in many parts of the city. His books include "How the Other Half Lives," "The Making of an American," "Out of Mulberry Street," "The Peril and the Preservation of the Home," "The Battle with the Slums," and "Theodore Roosevelt, the Citizen." He died May 26, 1914.

RILEY (rī'li), **James Whitcomb**, American poet, born in Greenfield, Ind., Oct. 7, 1853. His father was a successful business man of Greenfield and intended to have the son study for a profession, but he tired of his studies and became a sign painter. Later he joined a theatrical company, with which he traveled for some time, and in the meantime gave attention to preparing comic songs and revising plays. He began contributing both prose and verse to periodicals in 1875,



JAMES WHITCOMB RILEY.

and soon after engaged with the *Indianapolis Journal* as a regular writer. After several years he located in Greenfield, where he devoted his entire time to literary work, both as a writer of poems and as a public reader. The writings of Riley are very numerous, including many in the

hoosier dialect, while others are sentimental, tender, and prosaic. Few recent writers have been able to touch the popular taste so successfully, a fact evidenced by the large sale of his books and the great demand made upon him as a public reader. His works include "After-whiles," "Old Swimmin' Hole," "Green Fields and Running Brooks," "Pipes o' Pan at Zekesbury," "Boss Girl," "Poems at Home," "Character Sketches and Poems," "Child World," "Rhymes of Childhood," "Out to Old Aunt Marys," "An Old Sweetheart of Mine," and "Neighborly Poems." He died July 22, 1916.

RIMINI (rē'mē-nē), a city of Italy, on the Adriatic Sea, seventy miles southeast of Bologna, with which it is connected by a railroad. It is located on a fertile plain, on the banks of the Marecchia River, and contains a large number of monuments and historic buildings, including a cathedral adorned with sarcophagi. Among the manufactures are wine, glass sailcloth, clothing, and pottery. It has a considerable trade in agriculture products and merchandise. The city has several hospitals, a number of schools, and a public library of 30,000 volumes. About ten miles northwest of the city is a monumental pillar to mark the spot where Caesar stood at the time he addressed his army shortly before he crossed the Rubicon. Rimini had an unimportant history during the Middle Ages. It was attacked successively by barbarians, but for some time was important as an independent republic, its independence ending when Charlemagne annexed it to the papal territory. The independence of Italy and the construction of its railroad have given it a new era of prosperity. Population, 1916, 44,830.

RINDERPEST (rīn'dēr-pēst), or **Cattle Plague**, the name of an infectious fever among cattle, which is prevalent to a greater or less extent in some parts of Europe and Asia. Rinderpest is the German name and some localities it is known as *steppe murrain*. It is caused by a minute microbe, or organism, and it has its seat in the digestive organs of cattle, though it sometimes attacks other ruminant mammals. The early symptoms include a high fever and rapid beating of the pulse, and later the mouth and respiratory organs become affected, viscid secretions are discharged, and death ensues after five or six days. Since from 30 to 60 per cent. of the animals die under any treatment, it is best to promptly destroy or isolate all diseased animals. Russia has experienced several widespread epidemics of this disease, and it has appeared in a less extensive form in Austria, Turkey, and the Philippines.

RING, an ornament worn on the finger from remote antiquity, usually made of some metal chiefly of gold or silver. The *signet ring* was worn in ancient times as a sign of confidence or to indicate authority. Later rings came into use as articles of ornaments among the civilized nations, especially among the Jews and Persians,

who practice using betrothal and wedding rings. These frequently contain precious stones of great value. Rings as tokens of marriage came into almost universal use in Christendom and many were engraved with mottoes to indicate some sentiment, either of friendship or affection. The practice of wearing earrings is more recent, but rings seem to have been worn as adornments of the arms at a very early date. People low in the scale of civilization not only wear finger and arm rings, but they employ them as adornments to decorate the nose, ears, and toes. Some look upon a ring as a charm against evil, hence wear it a given number of days without removal. The Pope uses what is known as a fisherman's ring which is engraved with the picture of Saint Peter in a boat. With this ring the briefs are sealed. It is broken at the death of the Pope and his successor is presented with another by the city of Rome.

RINEHART (rīn'härt), **William Henry**, sculptor, born in Carroll County, Maryland, Sept. 13, 1825; died in Rome, Italy, Oct. 28, 1874. He was the son of a farmer and spent his boyhood in assisting at farm work and attending public school. Later he worked at stone cutting in the neighborhood. He went to Baltimore in 1846 as an apprenticed marble worker, and afterward studied in the Maryland Institute. His success caused him to be placed at the head of the ornamental department in a marble yard, and in 1855 he went to Italy to study sculpture and come in touch with Italian art, settling while there in Florence. After receiving instruction for two years, he returned to Baltimore and brought with him two bas-reliefs made while abroad, entitled "Night" and "Morning." He was employed by the government to execute a fountain figure for the post office in Washington, and the two figures that support the clock in the House of Representatives—"Indian" and "Backwoodsman." After remaining a few years in America, he settled permanently in Rome, where he continued working at his art until his death. Rinehart was an artist of superior talent and was philanthropic, leaving a fund of 45,000 to aid art students. His works include a statue of Chief Justice Taney, in Annapolis, Md.; "Latona and her Children," in the Corcoran Gallery, Washington; and "Love Reconciled with Death," in the Greenmount Cemetery, Baltimore. Other productions include "The Woman of Samaria," "Clytie," and "Rebecca."

RING OUZEL (ōō'z'l), a species of thrush found in Europe, which resembles in size and appearance the blackbird. It is migratory, moving far northward in Europe and Asia in the spring, and passing to the Mediterranean region and Africa in the fall. A crescent of white extends across the lower part of the neck, while the general color of the male is blackish and of the female a dark brown. These birds do dam-

age to cherries and other small fruits when ripe, but they also feed on insects and worms. Their nests are built in a clever manner of clay and grass, and usually from four to six eggs are laid. After the young are reared, they generally gather in flocks.

RINGWORM, a skin disease that appears in the form of circular patches. It is caused by a microscopic fungus parasite. The parasite preys upon the epithelial coverings of the skin, chiefly on the scalp, but also on the body. In men it affects the skin in the vicinity of the beard, especially on the chin and lower lip. It is both chronic and contagious. The best treatment consists in removing the hair and applying sulphurous acid, iodine, or glycerin.

RIO DE JANEIRO (rě'ô dâ zhâ-nâ'rô), the capital and metropolis of Brazil, on the southeastern coast, 75 miles southwest of Cape Frio. It stands on the western shore of the Bay of Rio de Janeiro, in which it has a magnificent harbor, one of the most beautiful and most secure in the world. The section along the bay is level, but it stretches westward over the slopes of low hills, and presents an appearance of remarkable beauty when viewed from the sea. The streets are well platted, though only a few have first-class pavements, while many of the buildings are small and of inferior architecture. Within recent years modern facilities have been supplied, such as telephones, electric and gas lighting, public baths, and electric street railways, but the city has long been noted for its beautiful gardens and parks, waterworks, and churches. Among the most noteworthy buildings are the capitol, the national museum, and the cathedral. It has numerous asylums, hospitals, and educational institutions. The College of Pedro II. was founded in 1837. Other institutions of learning include the Imperial Academy of Medicine, the National Educational Museum, and the Polytechnical Institute. It has several military, naval, art, and normal schools. The national library has 248,500 volumes and is open to the public. Another noteworthy feature of the city is its excellent water supply, with which are connected numerous fountains in the streets and public squares. Many of the public places are ornamented with statues and monuments.

The Bay of Rio de Janeiro was discovered in 1555 by the French, who formed a small settlement on the present site of the city, but it was captured by the Portuguese in 1567. Rio de Janeiro has always ranked as the most important trade center of Brazil. It is not only the chief military arsenal and political center of the republic, but it has fully one-half of the export and import trade of the country. The export trade consists largely of coffee, lumber, and minerals, and is estimated at a value of \$60,000,000 annually. The imports include mostly manufactured articles, though local enterprises are rapidly stimulating home production. Among the manufactures are furniture, tobacco products,

cotton and woolen goods, metalware, glass, paper, pottery, and leather. Several railways furnish communication with the interior and railroad facilities are maintained at Nitcheroy, on the opposite side of the bay, with which Rio de Janeiro is connected by ferry lines. The country surrounding the city produces immense quantities of lumber, live stock, coffee, and tobacco. Population, 1916, 1,148,640.

RIO GRANDE (rě'ô grân'dâ), a river of North America, which has its source in the San Juan Mountains of Colorado and, after a general course of 1,800 miles toward the southeast, enters the Gulf of Mexico a short distance below Brownsville, Tex. It is shallow in most of its course and is navigable only about 500 miles from its mouth. The channel is almost due north and south in New Mexico, where it receives the Puerco River, and thence forms the boundary between Texas and Mexico. The most important tributary is the Rio Pecos, in Texas. In Mexico it receives the Rio Conchos, the Rio Salinas, and the Rio San Juan. Brownsville, Tex., and Matamoras, Mexico, are the chief towns on its banks.

RIO NEGRO (nâ'grô), a large river of South America, one of the chief tributaries of the Amazon. The source is in the plains of southeastern Colombia, thence it flows east to the boundary of Venezuela, makes a curve toward the south, and, after receiving the Dos Upes River, flows southeast and joins the Amazon at Manaos, Brazil. The entire course is 1,250 miles, much of which is navigable. Large forests are contiguous to the Rio Negro, direct communication is maintained between the Rio Negro and the Orinoco by the Cassiquiari, thus joining the Orinoco and Amazon river systems into a great commercial route. Rio Negro is likewise the name of a large river of Argentina, south of which is the region known as Patagonia. The source is in the Andes Mountain of Chile. In its course, which is 700 miles, are many rapids and waterfalls. It flows into the Atlantic Ocean at about 41° south latitude.

RIOT (rî'ût), a tumult or disturbance of the peace by three or more persons, who assemble of their own authority to resist public officials or destroy public or private property. The assembly may be premeditated or spontaneous and it may have for its purpose to terrorize the public, or to carry out some process of a public character in an unlawful manner. Sometimes a mere frolic, as in a charivari, results in a tumultuous and terrifying riot. If three or more persons enter upon the execution of what ordinarily constitutes a riot, but fall short in carrying out their purpose, their offense is termed a *rout*. Rioting is prohibited by statutory law and the punishments prescribed include a fine and imprisonment or both.

RIPARIAN RIGHTS (rî-pâ'rî-an), the name applied to the right and privileges of those whose lands border upon or are bounded by

streams or rivers. Navigable bays, arms of the sea, and rivers are in most cases considered public highways, but the owners usually have the right of access, wharfage, and ferriage. In some countries the owner of land lying upon an unnavigable stream owns the bed of such stream to its center, while in others he has only the right to use the water under certain circumstances. For instance, he is not permitted to waste or pollute the stream, to divert the channel, or even to use all the water to the exclusion of other owners farther down the course. Even where a private stream runs through a premises, a part of the course being exclusively upon the property of a single owner, it cannot be polluted or used in a manner that would operate an injury to others.

RIPLEY (rĭp'li), **George**, author and journalist, born in Greenfield, Mass., Oct. 3, 1802; died in New York City, July 4, 1880. He first attended public schools and graduated from Harvard University in 1823. After studying theology in the Cambridge Divinity School, he became pastor of a Unitarian Church in Boston, in 1826. In 1840 he resigned his charge, lived for some years in Europe, and founded the *Transcendental Magazine*. Subsequently he originated the Brook Communistic Farm, which he abandoned in 1847 and removed to New York as a staff editor of the *Tribune*. He contributed to a number of magazines, and published the "American Cyclopaedia."

RIP VAN WINKLE, the name applied by Washington Irving to the hero of a legend published in 1820, which has taken a place among the classics of America. Almost all nations have a tradition about some sleeper who falls into the embrace of Morpheus and after a long period of dormancy awakens to marvel at the changes written in the sands of time. Among the noteworthy incidents of this kind handed down by tradition are the seven sleepers of Mount Celion, who slept 250 years. Nourjahad, wife of the Mogul emperor Geangir, who discovered the otto of roses, slept seven years. Epimenides, the Gnostic, is said to have slept 57 years.

Rip Van Winkle, according to the account given by Washington Irving of the legend, was a Dutch colonist of New York, who was noted at home as a good-natured, but idle and hen-pecked husband. It was his custom to spend much of his time in the quiet inn kept by old Nicholas Vedder instead of attending his patch of maize and potatoes, just at the outskirts of the little village on the Hudson River. Sorely tried by his scolding wife, he set out with his gun and dog for a hunt in the forests of the Catskill Mountains. In a wild glen among the rocks he met Hendrick Hudson and his strange crew of the *Half Moon*, whom he aided in carrying a keg of liquor. The strange company played ninepins in mysterious silence, and as the balls rolled together they caused sounds nearly

resembling peals of thunder, which lost none of their mystery as they bounded and reëchoed among the mountains. Rip became the waiter of this strange company, and as he drank of the sparkling liquid a deep stupor came over him until at length he fell into a sleep, from which he awoke only after a lapse of twenty years.

On awakening one pleasant summer morning, Rip found his dog gone and the firelock by his side was almost destroyed by rust. His beard had grown to an unusual length. On returning to his native village, he found strange faces on the streets and new names over the doors. His wife was dead, his own house was in decay, and the people who surrounded him looked upon him with distrust. At length he was recognized as Old Rip, who had disappeared mysteriously some twenty years before. Strangest of all is the realization that the quiet Dutch inn of Nicholas Vedder had been changed into the Union Hotel, and that before it was a painting of George Washington, instead of George III., due to the fact that the American Revolution had made him a citizen of an independent country. The story has been dramatized by a number of Americans, the most popular being the one of 1865, with which the name of Joseph Jefferson is associated.

RISTORI (rēs-tō'rē), **Adelaide**, or **Marquise del Grillo**, eminent tragic actress, born in Cividale, Italy, Jan. 26, 1821; died Oct. 9, 1906. She was the daughter of strolling players and thus became connected with the stage from infancy. In 1835 she appeared in the play entitled "Francesca da Rimini" and won great admiration and popularity. She played in Rome in 1849, but an attack by the French army caused her to enter a hospital as army nurse. Soon after the war she appeared in a number of leading Italian cities, and in 1855 played in Paris. Subsequently she made a tour of Canada, the United States, Mexico and South America. Her rôles meeting with greatest favor include *Lady Macbeth*, *Mary Stuart*, and *Marie Antoinette*.

RITTER (rĭt'tēr), **Carl**, eminent geographer, born in Quedlinburg, Germany, Aug. 7, 1779; died Sept. 28, 1859. After studying at Halle, he was made professor of geography at the University of Berlin in 1820, and subsequently became connected with the military school as director. The work of Ritter, both as a teacher and author, has had a marked influence upon the study of geographical science, since he originated methods that were not known before his time. He deserves particular mention because of systematically accounting for the formation of rivers, glaciers, mountains, and other natural phenomena, associating with each geographical phenomenon such historical, geological, and physiological facts as render the whole interesting and more or less concrete. His principal writings include "Geography in its Relation to Nature and the History of Man," "History of Geography," "General Geography," "Geographical and His-

torical Comparison of Europe," and "Architectural Monuments."

RITUAL (rīt'ū-āl), a book which contains the prayers and ceremonials of any kind, such as are used in churches, civic societies, or similar formal organizations. The term *ritualism* is generally applied to the extensive development of church ceremonials in the Church of England, especially as it came to be associated with the service of the Holy Communion by the High Church party about 1863. The purpose was to make the services more ornate and to employ a larger measure of the symbolic. In a general sense, ritualism may be said to embrace a system of conducting public worship according to prescribed forms, as distinguished from a system in which the form of worship is left chiefly to the discretion of the person in charge. Rituals are used largely in the Anglican, Roman, Greek, and several other churches.

RIVER, a stream of considerable size, usually formed of several brooks or creeks. It may flow into another river, a marsh, or some large body of water, as a lake, a gulf, or an ocean. Rivers are caused by drops of water falling upon the land, some of which sink into the surface and form springs and rivulets, while portions run down the slopes of the land and give rise to rills. The rivulets and rills usually combine with others and form creeks, which finally merge into a river. The land bordering on the sides of a river constitutes its *banks*. When descending a stream, the *right bank* is on the right hand and the *left bank* is on the opposite side. The depression in which it flows is called its *bed*, or *channel*. Other streams uniting with it are called its *affluents*, or *tributaries*. The place where it begins is its *source*, and where it ends, its *mouth* or *débouchure*. A region or district drained by a system of streams is termed a *river basin* and the division between two or more river systems is called a *divide*, or *watershed*. When two or more streams unite at the same place, as the Allegheny and the Monongahela at Pittsburg, they are said to form a *junction*.

Most rivers flow from higher land into lakes or into the sea, but many streams in arid countries either evaporate or the water sinks into the ground, such as the Humboldt River of the United States. The steepest slope is usually near the source and the most gentle near the mouth, but in many instances the head streams are in a flat country, as in the case of the Mississippi, and in others the rivers flow over escarpments in the lower course, as the Potomac and other streams of the Piedmont Plain. Large quantities of earth and rock are eroded by the action of the running water, but this effect depends upon the character of the channel and the rapidity of the flow. Where the bed offers considerable resistance, as in the Niagara, great falls and rapids result. In many instances the larger rivers flow into the sea or lakes by a slow current, as the Nile and the Mississippi, which gives rise to deltas. This is

true likewise of the Saint Lawrence, but it has no delta for the reason that the silt is dispersed or carried away by high tides or oceanic currents.

Rivers are of vast importance in the history of mankind, since they supply means of transportation and drainage, thus causing the rise of important cities and the growth of nations. They were even more important in the economic and political conditions of nations formerly than at present, since the building of railroads has made it possible for many manufacturing and commercial cities to develop importance even at considerable distances from the ocean or rivers, though it must be admitted that nearly all the great cities of the world are supplied with water navigation facilities.

Below is a table showing the length and area of some of the principal rivers:

NAME.	MILES IN LENGTH.	AREA OF BASIN, SQUARE MILES.
Mississippi-Missouri, N. A.....	5,545	1,600,000
Nile, Africa.....	4,100	1,425,000
Amazon, S. A.	3,500	2,500,000
Yang-tse-kiang, Asia.....	3,200	950,000
Yenisei, Asia.....	3,000	1,100,000
Lena, Asia.....	2,775	950,000
Congo, Africa.....	3,000	1,300,000
Mississippi, N. A.....	2,625	1,600,000
Cambodia, Asia.....	2,800	955,500
Amur, Asia.....	2,739	200,000
Hoangho, Asia.....	2,700	750,000
Niger, Africa.....	2,000	800,000
Volga, Europe.....	2,400	550,000
Obi, Asia.....	3,000	1,200,000
Colorado, N. A.....	1,200	230,000
Mackenzie, N. A.....	1,900	575,000
Yukon, N. A.....	2,000	200,000
Rio Grande, N. A.....	1,800	245,000
Brahmaputra, Asia.....	1,800	575,000
Indus, Asia.....	1,800	375,000
Danube, Europe.....	1,750	315,000
Tocontins, S. A.....	1,700	350,000
Irtish, Asia.....	1,625	412,000
Murray, Australia.....	1,125	270,000

RIVER LAND SETTLERS, a name applied to settlers on so-called Des Moines River lands in the State of Iowa. These lands embraced each alternate section of the public lands remaining unsold, or otherwise undisposed of, in a strip five miles wide on each side of the Des Moines River from its mouth to the north line of the State. They were granted to aid the Territory of Iowa in the improvement of the navigation of the Des Moines River. The settlers in many instances held patents or other evidences of title issued by the government subsequent to the grants. Some were evicted and others held continuous possession. Litigation involving the title to these lands continued over a period of nearly fifty years and ended in 1892.

Congress in 1893 passed an act to indemnify those settlers, their heirs, or assigns, holding patents or other evidences of title from the United States, who had been in continuous possession, and those persons, their heirs, or assigns, holding written evidences of title from the United States who had been evicted; and, third, those persons whose chain of title ran back to the per-

son making the original entry and who had purchased the paramount title.

In July, 1898, Congress passed an act appropriating additional funds and included those settlers who had in good faith filed preëmption or homestead claims, made settlement, and resided upon their lands for a period of not less than five years, unless sooner evicted, cultivated and made valuable improvements upon the land claimed, and in cases where such persons made actual settlement in good faith under the preëmption and homestead laws at a time when others were permitted to file on like lands and in good faith resided upon the same for a period of not less than five years, and who did not abandon said lands or procure title to other public lands.

RIVERSIDE, a city of California, county seat of Riverside County, on the Santa Ana River, 65 miles east of Los Angeles. It is on the Atchison, Topeka and Santa Fé, the Southern Pacific, and the San Pedro, Los Angeles and Salt Lake railways. The surrounding country is devoted to farming and fruit growing, especially figs, lemons, oranges, and grapes. Among the noteworthy buildings are the public library, the courthouse, the high school, and many fine churches. Wine, clothing, canned fruits, and machinery are among the manufactures. It has systems of public waterworks and sanitary sewerage. The first settlement in its vicinity was made in 1870, and it was incorporated in 1883. Population, 1900, 7,973; in 1920, 19,341.

RIVES (rêvz), **Amélie**, author, born in Richmond, Va., Aug. 23, 1863. She was educated under private tutors and in 1888 married John Armstrong Chanler of New York, from whom she was divorced. Later she married Prince Troubetzkoy, a Russian dignitary. Her writings are very numerous and some have been translated and widely read in Europe. They include "Virginia of Virginia," "The Quick or the Dead," "A Brother to Dragons," "Herod and Mariamne," "The Witness of the Sun," and "Barbara Dering."

RIVIERA (rê-vê-â'rà), meaning seashore, the name applied in Italy to a region bordering on the Gulf of Genoa. It is properly separated into two divisions, the western coast, or Riviera di Ponente, and the eastern coast, or Riviera di Levante. This region has beautiful scenery and may be reached by a railroad traversing the coast.

RIXDORF (rîks'dôrf), a city of Germany, in Prussia, situated immediately south of Berlin, with which it is connected by steam and electric railroads. The principal buildings include the city hall and courthouse, the post office, the central railroad station, and the public library. Among the manufactures are cotton and woolen goods, furniture, rubber and gutta-percha, linoleum, machinery, and scientific instruments. It is the seat of a noted school of agriculture and mechanic arts. The place was founded by Friedrich William I. in 1737. A large majority of the

inhabitants are Protestants. Population, 1905, 153,513; in 1920, 237,378.

ROACH, John, shipbuilder, born in Mitchells-town, Ireland, in 1815; died in New York City, Jan. 10, 1887. In 1829 he emigrated to America. He first worked as a machinist and later became the founder of important iron works. At the time of the Civil War he constructed six monitors and a number of large engines for the government. In 1871 he established the works of the Delaware River Iron Shipbuilding and Engine Company at Chester, Pa., an institution covering about 125 acres. It is one of the most noted of America and many large vessels, engines, and boilers have been constructed here.

ROAD, an open passage appropriated to public traffic, forming a line of communication for public use. The construction of highways is a matter of public concern and varies according to the state of civilization and the resources of the country through which they pass. Highways of an excellent quality were built by the Romans, which were in fact pavements resting on a foundation of rough stones consolidated into one mass by mortar or grout. However, they designed them on systems so that they centered into particular cities, instead of making them general, thus contributing largely to build up particular towns as trade emporiums. The roads as a whole were in a poor condition in Europe until the rise of the western powers, France and Germany taking an advanced rank in road making. It may be said that a marked change in road building has taken place since railroad construction began. Nations do not now expend as much time and money in highway building, but instead vest their construction and maintenance largely in local authorities.

Roadways are in a very backward condition in most of the Spanish-American countries, but there are notable exceptions, as in Cuba, where many of the highways are exceptionally well graded and macadamized. In Canada and the United States road building is a local matter. The work is done partly under county supervision in some instances, but generally it is under town or township superintendence. Congress authorized the construction of a national road westward from Boston in 1796, which passed through Pennsylvania, Ohio, and Indiana, but the construction of railroads caused it to fall into a state of neglect, though this particular road is still well graded. In hilly regions and many of the older settlements of North America, the roads do not conform to the direction of the compass, but in the newer sections the roads are located a distance of one mile from each other, thus dividing the land by straight lines into squares. This is true in general in the upper part of the Mississippi valley and in the south central part of Canada, where each section of land usually is surrounded by a road.

In road building it is necessary to take into account such natural obstructions as streams,

swamps, and hills, these requiring either bridges, embankments, grades, or tunnels. The breadth of the right of way usually is 66 feet, or four rods, and the width of the grade depends upon locality and traffic, though as a rule it is sufficiently wide for the passage of teams in all places. The advent of the bicycle and automobile has made the necessity of good roads even more apparent than formerly. Associations to promote the building of good roads are maintained in some localities, under whose direction new methods are studied and object lessons are given in the art of building culverts, grades, bridges, and other improvements that enter into the construction of a good road. It is customary for the driver to keep to the right when meeting vehicles and in driving on roads that cross each other, the right of way belongs to the driver who first reaches the intersection. It is obligatory on all persons driving upon the highway to exercise reasonable care in the safety of foot passengers and bicycles. The latter are considered to be in possession of a vehicle within the meaning of the law, and are entitled to one-half the improved road on an equal footing with drivers of other vehicles.

ROAD RUNNER, a bird of the cuckoo family, so named from its habit of running rapidly. The bill is long and slightly compressed, the head has an erectile crest, and the tail feathers are stiff and long. Some of the species are nearly two feet long and have a tail ranging from ten inches to a foot. The color is copper or bronze-green, with naked colored skin around and behind the eyes. This bird is frequently seen upon the roads ahead of carriages, and it is able to run faster than the fleetest horse. Although it lives chiefly upon the ground, it is very shy. Locally it is called *snake killer* and *chaparral cock*. Several species are native to Mexico and the southwestern part of the United States.

ROANOKE (rō-ā-nōk'), a city of Virginia, in Roanoke County, 250 miles west of Norfolk, on the Norfolk and Western Railroad. It is pleasantly situated on the Staunton River, which joins the Dan River at Clarksville to form the Roanoke River, and is surrounded by mining and agricultural country. The noteworthy buildings include the public library, the Rebekah Sanitarium, the high school, and the Virginia Female College. Among the manufactures are tobacco products, machinery, ironware, locomotives, cars, and hardware. In its vicinity are a number of mineral springs possessing medical value. It has electric railways, public waterworks, sanitary sewerage, and pavements of brick, macadam, and asphalt. Originally it was called Big Lick, but was incorporated as Roanoke in 1884. Population, 1920, 50,842.

ROANOKE, a river of the United States, formed in southern Virginia by the confluence of the Staunton and Dan rivers, and, after a course of 255 miles toward the southeast, flows

into Albemarle Sound. It is navigable to Weldon, N. C., a distance of 150 miles.

ROBBERY (rōb'bēr-y), the crime of taking money or goods from the person of another, or in his presence, against his will, with force or violence. It differs from larceny in that robbery is accompanied by violence or intimidation and is committed in the presence of the owner. This crime is termed *highway robbery* when it is committed by taking property from travelers. The punishment is various, depending upon the conditions under which the offence is committed. If the offender is armed with a dangerous weapon at the time of such robbery, the penalty is severe. In most cases an assault with an intent to rob is punishable by confinement in prison. Robbing or attempting to rob a passenger train is punishable in some countries by imprisonment for life.

ROBBIA (rōb'bē-ä), **Della**, the name of a celebrated family of Italy, whose members produced many fine works of Florentine art. Luca della Robbia, born in 1399, is noted as the originator of famous productions in terra cotta. These works were coated with an enamel as a protection against the influence of the atmosphere. He died in 1482. His nephew and pupil, Andrea della Robbia (1435-1525), is celebrated for his ability to give a lifelike modeling to the human form. One of his productions, representing the last judgment, is in the church of San Girolamo, at Volterra, Italy.

ROBERT I. (rōb'ērt), King of Scotland. See **Bruce**.

ROBERT II., King of Scotland, born March 2, 1316; died April 19, 1390. He was the son of Marjory, daughter of Robert Bruce, and Walter, steward of Scotland, hence the first of the Stuart kings. Both his parents died while he was yet an infant, but he was recognized as heir to the crown by Parliament in 1318 and, after the death of David II., in 1371, was formally crowned at Scone. In 1384 Scotland was invaded by the Duke of Lancaster, and the English made a second invasion under Richard II. in 1385. Robert made a retaliatory expedition into England in 1388, which culminated in the Battle of Otterburn on July 21, 1388.

ROBERT III., King of Scotland, eldest son of Robert II., born in 1340; died April 4, 1406. He was crowned king in 1390. At first the government rested largely in the hands of his brother, Earl of Menteith. Scotland was invaded by Henry IV. of England in 1400, but he soon withdrew his forces. The following year a Scotch army under Archibald Douglas made an expedition into England, which resulted in the defeat of the Scots at the Battle of Homildon Hill, in 1402. James, second son of Robert, was sent to France in 1406, but was captured by the English and retained for some time as a prisoner by Henry IV. This so grieved the king that he died at Rothesay soon after.

ROBERTS, Brigham Henry, author and statesman, born in Warrington, England, March 13, 1857. He came to the United States in 1866 and settled in Utah, where he graduated from the normal department of the Utah University in 1878. Being a member of the Mormon Church, he married three times before polygamy was abolished in 1890. He served as a member of the Utah constitutional convention in 1895 and in 1898 was elected to Congress, but opposition to his admission as a member on account of his polygamous relations soon arose. This opposition took form in a petition signed by 7,000,000 persons, asking that he be denied a seat in Congress. Roberts defended his claim for admission with marked ability, but when it came to a vote, in 1900, he was excluded on roll call, the vote being 268 in favor of exclusion out of a total of 318. Roberts contributed to many periodicals and magazines and traveled extensively. Among his published works are "Life of John Taylor, Third President of the Mormon Church," "New Witness of God," "Outlines of Ecclesiastical History," and "The Gospel."

ROBERTS, Charles George Douglas, poet, born at Douglas, New Brunswick, Jan. 10, 1860. He studied at the Fredericton Collegiate School and subsequently attended the University of New Brunswick. From 1883 to 1884 he edited *The Week* at Toronto and in 1885 was made professor of English and French literature in King's College, Nova Scotia. After serving efficiently for two years, he was elected professor of economics and international law in the institution and resigned in 1895 to devote himself to literary work. He became connected editorially, in 1897, with the *Illustrated American* published at New York. Many of his writings deal with animal life. His works in prose embrace "By the Marshes of Minas," "Around the Camp Fire," "The Forge in the Forest," "The Kindred of the Wild," "The Heart of the Ancient Wood," and "A History of Canada." He produced a number of poetic works, including "Songs of the Common Day," "In Divers Tones," "Orion and Other Poems," and "Book of the Native."

ROBERTS, David, painter, born at Stockbridge, Scotland, Oct. 24, 1796; died Nov. 25, 1864. He took up the study of decorative painting at an early age, but later devoted much time to the picturesque in architecture. For a number of years he studied at the Trustees' Academy, Edinburgh, and soon after settled in London, where he was a scene painter. In 1824 he made a tour of Europe, Palestine, and Egypt, and in 1841 was made a Royal Academician. As an architectural painter he takes rank among the leading artists of England. The ruined buildings and Gothic cathedrals were his favorite themes. His leading works include "Statue of Memmon at Sunrise," "Church of the Holy Nativity at Bethlehem," "The Holy Land and

Syria," "The Destruction of Jerusalem," "Rome and Saint Peter's at Rome," and "London from the Thames."

ROBERTS, Sir Frederick Sleigh, British military leader, born in Cawnpore, India, Sept. 30, 1832. He was educated in England, studying at Eton and Addiscombe, and in 1851 entered the army as second lieutenant. His first actual experience in war was in the siege and capture of Delhi, in 1857, where he was wounded, but later he took part in the engagements of Lucknow, Cawnpore, and Malka. In 1867 he joined the Abyssinian expedition, accompanied the Lushai expedition of 1871-72, and in 1878 was made commander of the Kuram division of the army. He commanded an expedition for the relief of Kandahar, for which purpose he traversed a hostile mountainous region for over 300 miles, from Kabul, Afghanistan, in a period of twenty days and succeeded in crushing Ayub Khan at the end of the march. He commanded the army of Madras from 1881 to 1885, becoming commander in chief for India in the latter year. He was raised to the peerage in 1892, and in 1895 was appointed to command the forces in Ireland. In 1899 he superseded Sir Redvers Henry Buller (born in 1839) as commander of the British forces in South Africa, and in 1900 became commander in chief of the army, succeeding Field-Marshal Wolseley, thus attaining the highest position in the British army. He received many distinguished honors and titles, among them an earldom from Queen Victoria in 1901. He commanded in France in 1914, dying there Nov. 14, 1914.

ROBERTSON (röb'ërt-sün), **Frederick William**, eminent clergyman, born in London, England, Feb. 3, 1816; died Aug. 15, 1853. He descended from Scotch parents, attended the grammar school of Beverley, and in 1832 entered the Edinburgh Academy. In 1837 he graduated from Oxford University and the following year became curate of Saint Maurice, but resigned on account of ill health and traveled in various countries of Europe. After returning to England, he became curate at Cheltenham, in 1842, and five years later was made incumbent of Trinity Chapel, Brighton, a charge he filled successfully until his death. Robertson attained eminence by his originality, human sympathy, and industrious habits, always presenting his themes with marked interest. He was accused of being unorthodox because of his views on baptism, inspiration, and the atonement, and his friendship for the working classes caused the more aristocratic to assail his preaching as being socialistic and democratic. He is the author of a number of works on religion and founded the Workingmen's Institute in Brighton. "Lectures on the Influence of Poetry on the Working Classes" is one of his best known works.

ROBERTSON, James, soldier and pioneer, born in Brunswick County, Virginia, in 1742; died in 1814. His parents removed to North

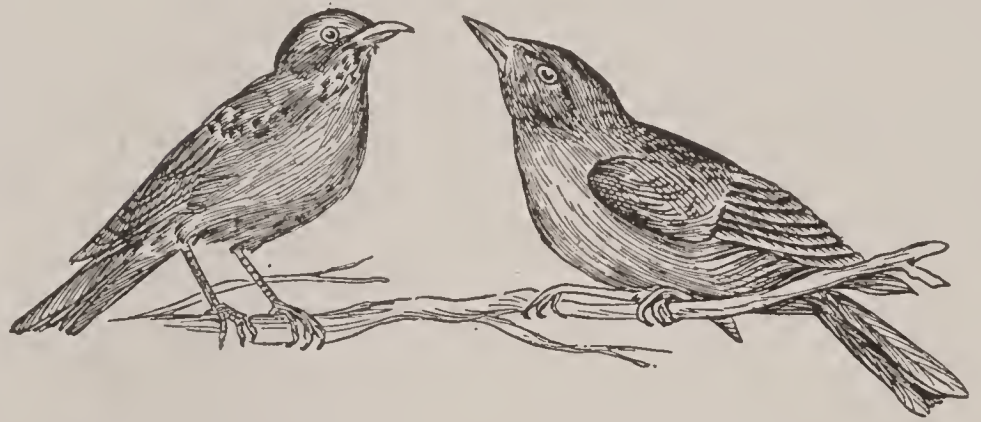
Carolina, where he became acquainted with Daniel Boone. In 1770 he accompanied the latter on a trip into Tennessee, where he aided in founding the Watauga Association, which was the first compact to form a government west of the Allegheny Mountains. He was an influential member of the settlement and was conspicuous in operating against the Indians. In 1778 he and Richard Henderson purchased a tract of land and founded the city of Nashville, which later became the capital. He was made brigadier general when Tennessee was organized as a Territory, in 1791, and after its admission as a State he served in the Legislature. In the War of 1812 he did much to retain the friendship of the Indians and prevent them from joining the British.

ROBESPIERRE (rō'bēs-pēr), **Maximilien Marie Isidore**, eminent statesman, born in Arras, France, May 6, 1758; guillotined July 28, 1794. After studying in the schools of his native town he entered the College of Louis-le-Grand in Paris, where he graduated. Later he studied law and established himself as an advocate in Arras. In 1783 he became a member of the Academy of Arras, and in 1789 was elected a deputy to the assembly of France, where he became distinguished as an advocate of democracy. Though a man of under stature and a shrill voice, he was a powerful influence and exerted himself as a leader of revolutionary clubs, particularly of the Jacobins. It may be said that he represented the spirit and history of the Revolution after the death of Mirabeau, since his power was almost unlimited. In 1791 he became public accuser of the new courts of judicature, and, after the dissolution of the assembly, he visited Arras, but returned soon after to plan the massacres of 1792, though remaining in the background, while Marat and Danton carried out his designs. He was elected first deputy of Paris in the same year and shortly became a member of the convention that was to determine the fate of Louis XVI.

As a member of that body the efforts of Robespierre were tireless in favor of executing the king, which took place in December, 1792. Soon after followed his memorable contest with the Girondists, by whom he was made an object of attack. In this struggle he was supported by many leaders who wanted to give France preponderance in its contest with Europe and cared little for personal questions. The excitable events of that unfortunate period caused him to part friendship with Hébert and his associates, who were guillotined by a vote of the convention on March 19, 1794. He also differed from Danton and Camille Desmoulins, who were brought to the guillotine on April 5 of the same year. Robespierre was now completely in control and the *Reign of Terror* was inaugurated, but a party soon formed in the con-

vention in opposition to him, and he was publicly accused of despotism on July 27, 1794. Soon after he was thrown into Luxemburg prison, but the keeper released him the same night, and his supporters collected for his defense in the Hall of Commune. A force of arms under Barras was sent for his arrest the following day. At the sight of bayonets he was deserted by his followers and taken before the tribunal, where he was speedily convicted as an outlaw. The next day he was guillotined along with 23 of his supporters, including Saint-Just and Couthon.

ROBIN, or **Robin Redbreast**, the name applied to several species of birds of the warbler family, which are native to Europe. They are so named from the red breast of the male, the female having a breast of a yellowish-brown color. The robin in America is a species of thrush and is much larger than the redbreast. It is ten inches long, has a black head and back,



ROBIN REDBREAST.

GOLDEN ROBIN.

and the breast is chiefly of an orange color. The female is duller than the male. It is migratory, reaching the northern states and Canada in the spring. Two broods of young are reared each year, usually from four to six in each brood, and they return to the same locality the following season. Robins are familiar birds and have a pleasantly modulated song.

ROBINSON (rōb'in-sūn), **Edward**, biblical scholar, born at Southington, Conn., April 10, 1794; died Feb. 5, 1863. He graduated at Hamilton College, Clinton, N. Y., and was a teacher in classical studies at that institution until 1821. While there he assisted in publishing and translating a number of texts in the classical languages. In 1826 he went to Germany to study at Göttingen and Berlin and in 1830 became an instructor at Andover, Mass. Subsequently he was professor in Union Theological Seminary, New York, where he labored continuously from 1837 until his death. He made several tours of Europe and Palestine and published a physical geography of the Holy Land. His second wife, Theresa von Jakob (1797-1869), whom he married in 1828, was the daughter of a distinguished professor at Halle. She wrote a number of excellent works under the name of *Talvi*. Her publications include "Folk Songs of the Servians" and "The Black Dwarf." She edited a number of works written by her hus-

band and translated from several European languages.

ROBINSON CRUSOE. See **Juan Fernandez.**

ROB ROY, meaning Robert the Red, celebrated Scottish outlaw, born in 1660; died Dec. 28, 1738. His true name was Robert McGregor, but he assumed the name of his mother's family, that of Campbell, because the Scotch Parliament, in 1662, had outlawed the McGregor clan. His estate was on the east side of Loch Lomond, where he engaged extensively in rearing and training cattle, but in the rebellion of 1715 he supported the cause of the pretender. Previous to this he had borrowed money of the Duke of Montrose, but his financial losses made him unable to repay it, and the duke took advantage of the opportunity by depriving him of his estate. He became desperate on account of his misfortune and gathered a band of followers to make reprisals upon the property of the duke, driving away his cattle and consuming the grain harvested by his tenants. The English stationed a garrison at Inversnaid to apprehend the intruder, but they were unable to capture him or prevent his marauding raids. A reward of \$5,000 was offered for his head, when he found shelter in a cave of Ben Lomond. Later he became reconciled with the duke and lived peaceably at Balquhider, where his death occurred. In 1817 Sir Walter Scott published his celebrated novel, "Rob Roy," in which the daring exploits of this famous character are recounted.

ROC, or **Rukh**, in Arabian and Persian mythology, a huge bird, capable of carrying off an elephant and devouring it. It is mentioned in the "Arabian Nights' Entertainments" and, according to Adolf Erman, was suggested by the fossil tusks of a giant bird. In the Middle Ages a general belief prevailed in the existence of such a bird, a fact borne out by a number of writings coming down to us from that period. The first knowledge of this myth spread in Europe soon after the first Crusade.

ROCHAMBEAU (rô-shâm-bô'), **Jean Baptiste Donatien de Vimeur, Count of**, eminent soldier, born in Vendôme, France, July 1, 1725; died May 10, 1807. He secured a liberal education for the priesthood, but entered the army in 1742, and in 1749 became governor of Vendôme. In 1780 he came to America as the head of a body of French troops to aid the colonists in the Revolution against England. He established his headquarters at Newport, R. I., thence marched, in 1781, against a detachment of Clinton's army, which he defeated on Manhattan Island, and later joined Washington's army in the siege of Yorktown, aiding efficiently until the war ended by the surrender of Cornwallis. Soon after he returned to France, where he became a deputy to the assembly in 1788 and in 1791 was created field marshal. During the French Revolution he was imprisoned as an opponent of Robespierre, and the death of the latter saved him from the

guillotine. Napoleon created him grand officer of the Legion of Honor in 1804.

ROCHDALE (röch'dāl), a city of England, in Lancashire, ten miles north of Manchester. It is situated on both sides of the Roch River, has extensive railroad connections, and is surrounded by a country which is rich in deposits of coal and building stone. Among the manufactures are cotton and woolen goods, machinery, hats, hardware, and pottery. A cathedral dating from the 12th century is the most conspicuous building, but it has many fine modern structures, such as hospitals, schools, and churches. The commercial trade is enhanced by canal and railroad connections with many trade centers of northern England. It has electric street railways, public waterworks, and stone and macadam pavements. Anciently it was known as *Recedam*. Population, 1921, 91,437.

ROCHEFORT (rôsh-fôr'), a city of France, in the department of Charente-Inférieure, eighteen miles southeast of La Rochelle. It is situated on the Charente River, nine miles from the sea, and is strongly fortified. The harbor is well improved with wharves and by dredging and has extensive dockyards. It has a fine marine hospital, several schools and colleges, and a growing trade in merchandise and cereals. The manufactures include cannon, clothing, sailing vessels, furniture, and machinery. Rochefort was a fishing village until 1666, when Louis XIV. established a naval station and planned the fortification. Population, 1916, 36,694.

ROCHEFORT, Victor Henri, journalist and statesman, born in Paris, France, Jan. 30, 1830. After attaining a liberal education, he engaged with the Paris *Figaro* as a writer of dramatic and art criticism, and later became a member of the editorial staff. In 1868 he founded *La Lanterne*, a periodical opposed to the empire, which was soon suppressed by the government and Rochefort fled to Belgium, where he continued the publication of his paper. He was elected to the legislative assembly from Paris in 1869, when he immediately returned to France, and soon after founded *La Marseillaise*. His course was favorable to a republic and he was again sentenced to imprisonment in 1870, remaining in confinement until the fall of the empire, as a result of the Battle of Sedan. After being liberated, he immediately became prominent in the government and in 1871 was elected deputy. He was charged with instigating the excesses of the Communists and was sentenced for life to New Caledonia, a French penal station in the Pacific Ocean, from which he escaped in 1873 and came to San Francisco, Cal. By the amnesty of 1880 he was permitted to return to France, where he was elected to the chamber in 1885, but resigned his seat the following spring. He published "Adventures of My Life." He died July 1, 1913.

ROCHELLE (rô-shêl'), **La**, a seaport of France, on the Atlantic, capital of the department of Charente-Inférieure, 95 miles northwest of

Bordeaux. It is strongly fortified, has railroad facilities, and maintains a commodious harbor. The streets are well planned and beautifully improved, many of them having fountains and monuments. Among the manufactures are sugar, glass, cotton goods, spirituous liquors, and machinery. The trade consists principally in wines, merchandise, and supplies intended for the colonies. Its ancient name was *Rupella*, meaning little rock, and it has been the seat of a number of important battles. At the time of the Reformation it was a stronghold of the Protestants. A Catholic army besieged it in 1573, but a treaty was concluded by which the Huguenots were granted liberty of worship. Population, 1916, 32,595.

ROCHESTER (röch'ës-tër), a city in Minnesota, county seat of Olmsted County, on the Zumbro River, 35 miles south of Red Wing. Communication is furnished by the Chicago Great Western and the Chicago and Northwestern railroads. It is surrounded by a fertile farming and dairying country, which produces cereals and grasses. Rochester has large grain elevators, stock yards, flouring mills, and machine shops. The noteworthy buildings include the county courthouse, the high school, the opera house, the Saint Mary's Hospital, the Masonic Temple, the Odd Fellows' Hall, and the State Hospital for the Insane. It has systems of public waterworks and sanitary sewerage. Rochester was settled in 1854 and incorporated in 1858. Population, 1905, 7,233; in 1920, 13,722.

ROCHESTER, a city of New Hampshire, in Strafford County, on the Cochecho River, 76 miles north of Boston, Mass. It is on the Boston and Maine Railroad and has a large trade in merchandise. The chief buildings include the public library, the high school, and the Gaffney Home for the Aged. Among the manufactures are woolen goods, leather, boots and shoes, bicycles, machinery, and earthenware. The surrounding country is agricultural, and produces fruits and cereals. The place was settled in 1728 and incorporated as a city in 1891. Population, 1900, 8,466; in 1920, 9,673.

ROCHESTER, a city of New York, county seat of Monroe County, the third largest city of the State. It is situated on the Genesee River, seven miles from Lake Ontario and seventy miles northeast of Buffalo. Communication is furnished by navigation on the Great Lakes and by the Pennsylvania, the West Shore, the New York Central, the Erie, the Lehigh Valley, and other railroads. In the northern part of the city are extensive falls and rapids in the course of the river, which furnish an abundance of water power. The river is crossed by about ten bridges, some of which are over 200 feet above the stream. The river has a total fall of 257 feet within the city limits and the largest cataract has a descent of 95 feet. A stone aqueduct 850 feet long and 45 feet wide carries the Erie Canal across the river.

DESCRIPTION. Rochester has an elevation of 260 feet above Lake Ontario and 500 feet above sea level. It is regularly platted, the streets crossing each other at right angle, and it covers an area of twenty square miles. Beautiful lawns and avenues of shade trees give the residential part a fine appearance and many parks are well improved. The city has a park system of 700 acres. These include a number of small parks and squares in various parts. Those of the larger size are Highland, East and West Seneca, and Genesee Valley parks. Genesee Park, the largest in area, includes 340 acres. In East Seneca Park are fine zoölogical gardens and Highland Park has an extensive collection of shrubs and rare trees. In Washington Square is the Soldiers' and Sailors' Monument. Mount Hope Cemetery, one of the finest in the city, contains the grave of Frederick Douglass, and in one of the city squares is a statue to his honor. Many of the streets are paved with granite, asphalt, and macadam. They are well graded and drained, are lighted with gas and electricity, and contain an extensive system of drainage. Intercommunication is by electric railways, which extend to many interurban points and other cities, including Syracuse and Buffalo.

BUILDINGS AND INSTITUTIONS. The architecture is modern and substantial. Among the principal buildings are the county courthouse, the city hall, the post office, the State arsenal, the chamber of commerce, the Masonic Temple, the Wilder building, the German-American building, and the Powers Hotel. It is the seat of a State industrial school, a hospital for the insane, the Western New York Institution for Deaf Mutes, and various scientific and educational associations. The leading institutions of learning include the University of Rochester, the Rochester Theological Seminary, the Wagner Memorial College, and the Saint Bernard's Seminary. Mechanics' Institute, a celebrated industrial school, has an attendance of about 4,225. The public school system is well organized and supplied with apparatus and libraries. The largest collection of books in the city include the Reynolds library, the Central library, and the Law library, the first mentioned having a collection of 60,000 volumes. All the leading denominations have fine church buildings and some of them maintain schools for the education of the youth.

INDUSTRIES. The manufacturing enterprises of Rochester are very extensive, due chiefly to its supply of water power and excellent avenues for distributing the products. It carries a large lake commerce, as well as an extensive inland wholesale and jobbing trade. The manufacture of flour is an important enterprise. Photographic apparatus and optical instruments are made in large quantities and the output is shipped to nearly all countries of the world. In its vicinity are extensive nurseries of shrubs, flower bulbs, and fruit trees. Clothing, boots and shoes, pipe tobacco and cigars, machinery, and furniture are

produced in large quantities. Other manufactures include vinegar, malt liquors, saddlery, lubricating oil, and farming implements.

HISTORY. The first settlement on the site of Rochester was made in 1810, when the land was owned by Nathaniel Rochester, after whom the city was named. In 1822 it was known as Rochester-ville, when it contained only a few frame houses, and it was chartered as a city of Rochester in 1834. Trade was greatly extended by the opening of the Erie Canal in 1825, through which it became directly connected with Buffalo, Albany and New York City. It has had a rapid growth continuously since the Civil War. Population, 1905, 181,666; in 1920, 295,750.

ROCKEFELLER (rök'ê-fêl-lêr), **John Davidson**, capitalist, born in Richford, N. Y., July 8, 1839. His parents removed to Cleveland,



JOHN D. ROCKEFELLER.

Ohio, in his infancy, where he attended the public schools and in 1858 entered business on his own account. Well applied industry and aptitude for affairs made it possible for him to succeed, though his means were at first limited. In 1860 he entered the petroleum business on a small scale, but soon became proprietor of a refinery in Cleveland, and in 1870 was made president of the Standard Oil Company, a vast corporation of a monopolistic nature. Rockefeller is noted for his liberality in supporting educational and religious institutions, his gifts for that purpose amounting to millions of dollars. In 1889 he furnished the means to reconstruct the University of Chicago and made endowments to it that aggregate about \$23,515,322. Subsequently he greatly increased his gifts to this institution and gave large sums in support of Vassar College, Yale University, and a general board of education. In 1908 his company was fined \$29,240,000 at Chicago, Ill., by Judge Kenesaw M. Landis for gross discriminations in selling and shipping oil.

ROCKEFELLER, **William**, capitalist, born in Richford, N. Y., May 31, 1841. He began his business career as a bookkeeper, but soon joined his brother, John D. Rockefeller, in the oil business. In 1861 he became the head of the business in New York City and for some time was president of the Standard Oil Company. His business enterprises and investments yielded large returns, hence he may be classed with the leading capitalists of America. Besides extensive holdings in banks and mining companies, he invested heavily in stock of the New York Central, the Northern Pacific, the Chicago, Milwaukee and Saint Paul, the Delaware, Lacka-

wanna and Western, the Lake Shore and Michigan Southern, the Hartford and Connecticut, and other railroads. He died June 24, 1922.

ROCKET. See **Fireworks**.

ROCKFORD, a city in Illinois, county seat of Winnebago County, on Rock River, 86 miles northwest of Chicago. It is on the Illinois Central, the Chicago and Northwestern, the Chicago, Milwaukee and Saint Paul, and the Chicago, Burlington and Quincy railroads. The noteworthy buildings include the county courthouse, the Carnegie Library, the high school, the Saint Anthony's Hospital, the Rockford College for Women, and the Ransom Medical and Surgical Sanitarium. Power for industrial purposes is obtained by a dam across the river. The manufactures include pianos, furniture, clothing, cigars, sugar, flour, machinery, hardware, and dairy products. It has electric and gas lighting, sanitary sewerage, public waterworks and an extensive system of electric street railways. The surrounding country is noted for its fertility and the production of large quantities of dairy products. The place was settled in 1834 and incorporated as a city in 1852. Population, 1920, 65,651.

ROCK HILL, a city of South Carolina, in York County, eighty miles north of Columbia. It is on the Southern Railroad and is surrounded by a fertile fruit and cotton growing region. The Winthrop Normal and Industrial College of South Carolina is located here. It is the seat of the Catawba Military Academy. The manufactures include cotton textiles, flour, furniture, machinery, brick and pottery, and lumber products. Electric lighting, waterworks, and sewerage are among the public utilities. Population, 1900, 5,485; in 1920, 8,809.

ROCKINGHAM, county seat of Windham County, Vt., on the Williams River and on the Rutland and other railroads. The industries include paper mills, machine shops, and cotton mills. It has fine public improvements. The place was settled in 1750 and incorporated in 1875. Population, 1920, 6,231.

ROCKING STONES, or **Logan Stones**, the large stones that are poised so as to rock when pressure is applied. It is thought that this phenomenon is due in many cases to boulders having been deposited by the action of glaciers, but some rocking stones have been formed by the action of wind, water, and other similar natural causes. The most remarkable example of this class is found in the rocking stone of Tandil, in Argentina, about 200 miles south of Buenos Ayres. It weighs 700 tons and is so nicely poised as to rock in the wind.

ROCK ISLAND, a city of Illinois, county seat of Rock Island County, on the Mississippi River, opposite Davenport, Iowa. It is on the Hennepin Canal and on the Chicago, Rock Island and Pacific, the Chicago, Milwaukee and Saint Paul, the Chicago, Burlington and Quincy, and other railroads. A fine bridge built by the government, costing about \$1,-



(Opp. 2433)

SCENE IN THE ROCKY MOUNTAINS.

Notice the railway track and the train.

200,000, connects it with the opposite side of the river. Rock Island, an island in the Mississippi, contains the United States arsenal and armory, which covers about 1,000 acres. The streets are well paved and finely improved. It has extensive machine shops, foundries, and railroad roundhouses. Among the chief manufactures are cotton goods, ironware, wagons, glass, flour, lumber products, machinery and agricultural implements.

Rock Island has many fine buildings and beautiful houses. It is the seat of the Lutheran Augustana College, an institution founded in 1860, which has about 600 students. Other noteworthy buildings include the county courthouse, the Federal building, the public library, the high school, and the Saint Anthony Hospital. Rock Island is surrounded by a rich farming country, which contains deposits of bituminous coal. It has a growing trade in merchandise. The place was settled in 1834 and was incorporated in 1852. Population, 1900, 19,493; in 1920, 35,177.

ROCKLAND, a city in Maine, county seat of Knox County, on Penobscot Bay, 85 miles northeast of Portland. It is on the Maine Central Railroad and has a fine harbor. Among the features are the county courthouse, the public library, the Federal building, and many schools and churches. The chief manufactures are boots and shoes, clothing, boilers, sailing vessels, lime, and machinery. The surrounding country is fertile, producing cereals and grasses, and contains mineral deposits, mostly granite and limestone. In 1630 the first settlement was made in its vicinity. It was first known as East Thomastown, but the name was changed to Rockland in 1850. Population, 1920, 8,109.

ROCKLAND, a town of Massachusetts, in Plymouth County, 16 miles southeast of Boston. It is on the New York, New Haven and Hartford Railway and is a commercial and manufacturing center. The public library contains 12,500 volumes. It has electric lighting, waterworks, and several fine schools and churches. The manufactures include boots and shoes, hardware, clothing, and machinery. Originally it was a part of Abington, but was incorporated as a separate town in 1874. Population, 1905, 6,287; in 1920, 7,544.

ROCK RIVER, a stream that rises in Wisconsin, thence flows through Illinois and joins the Mississippi immediately south of Rock Island. It has a course of 375 miles and flows through a rich farming country. Among the cities on its banks are Janesville, Beloit, Rockford, Sterling, and Rock Island.

ROCKS. See **Geology**.

ROCK SPRINGS, a city of Wyoming, in Sweetwater County, 252 miles west of Laramie. It is on Bitter Creek and the Union Pacific Railroad and is surrounded by extensive coal-mining districts. Electric lighting, waterworks, a public library, and a system of drainage are

among the public improvements. It has several fine schools and churches and is the seat of the Wyoming State Hospital. It is the center of a large trade in coal, clothing, lumber, and machinery. Population, 1920, 6,455.

ROCKVILLE, a city of Connecticut, in Tolland County, on the Hockanum River, fifteen miles northeast of Hartford. It is on the New York, New Haven and Hartford Railroad, and has an abundance of power from the river, which has a descent of 250 feet in the city. The supply of water is obtained from Snipsic Lake. Among the principal buildings are the public library, the high school, and many fine churches. It has manufactures of cotton, silk and woolen goods, paper, stationery, and machinery. The vicinity was settled in 1721, but the place was not platted until 1840. It was incorporated as a city in 1889. Population, 1920, 7,726.

ROCKY MOUNTAIN GOAT, a ruminant quadruped native to the Rocky Mountains, ranging from Idaho to the Arctic Circle. It is a beautiful animal, covered with long white



ROCKY MOUNTAIN BIGHORN.

hair, and its skin is valued in the market. The flesh is tender and nutritious. Its size is about that of the domestic goat, but the limbs are stronger and the body is heavier. The mane is erect, the horns are slightly curved, and the beard on the throat is quite like that of a goat, but it is a much finer looking animal. The *Rocky Mountain sheep*, or *bighorn*, is an allied animal. It has shorter hair and immense horns.

ROCKY MOUNTAINS, an extensive mountain system, embracing the most elevated peaks of North America. The name is sometimes applied to the entire mountain region in the western part of the United States, but it belongs more particularly to the eastern system of the Cordilleras of North America, extending from the southern part of New Mexico to the Arctic Ocean, terminating near the north-eastern corner of Alaska. This portion of the western highlands extends from New Mexico in a northwesterly direction, has a length of more than 1,000 miles, and incloses several very

arid and elevated plateaus. It is widest at about the latitude of 40° and the trend is nearly parallel to the Pacific coast.

The principal ranges in New Mexico are the San Andres, Manzano, Gallinas, and Taos mountains. Castilla Peak, in the last named range, is one of the highest elevations, being 12,615 feet above sea level. In Colorado many complicated ranges extend nearly parallel to each other, the most elevated peaks being Pike's Peak, 14,150 feet; Gray's Peak, 14,345 feet; Long's Peak, 14,275 feet; and Mount of the Holy Cross, 14,176 feet. The Laramie, Big Horn, and Shoshone mountains are among the ranges of Wyoming; Fremont Peak, in the Wind River range, is one of the most elevated peaks in Wyoming, being 13,570 feet. The Wasatch Mountains trend in many parallel ranges through Utah, and in the northern region of that State is an extensive lake system, including Great Salt Lake. The principal ranges include Gilbert Peak, 13,690 feet; Mount Hilgard, 11,460 feet; Mount Terrill, 11,600 feet; and Wheeler Peak, 12,075 feet. The lofty ranges of the Bitter Root Mountains form part of the boundary between Montana and Idaho, with connected ranges in each State and in Washington, whence the Rocky Mountain system passes into Canada.

In Canada it forms the boundary between Alberta and British Columbia, whence the principal ranges pass through the upper part of the latter and thence northwesterly through Yukon, with ranges trending westward into Alaska. The most elevated peaks of Canada include Mount Brown, 16,000 feet; Mount Hooker, 15,700 feet; Mount Logan, 19,514 feet; and Mount Saint Elias, 18,010 feet. The two last named are near the Alaska boundary and some distance northwest in Alaska is Mount Wrangel, 19,400 feet high. In 1901 the United States geological survey reported that Mount McKinley, height 20,464 feet, is the highest peak in territory belonging to the United States. It is situated about 200 miles northwest of Mount Wrangel, which was formerly considered the highest peak in Alaska.

The Rocky Mountains are rich in minerals, which include gold, silver, copper, iron, granite, coal, petroleum, and many others, and the region possesses some of the most extensive and productive mines in the world. The building of railroads in practically all parts of this mountain region has caused the rise of great cities, while settlers have been attracted there to establish productive vineyards, orchards, and farms. In many regions stock raising is a vast industry. Some portions are noted for their excellent scenery, particularly the Yellowstone National Park, in Montana, and the Rocky Mountain Park, near Banff, Alberta. The Missouri, Columbia, Colorado, Rio Grande, Arkansas, Mackenzie, Saskatchewan, Yukon, and other great rivers of North America have their source in the Rocky Mountains.

RODENTIA (rô-dên'shĭ-ă), or **Rodents**, an order of mammals characterized by the incisors being shaped so they can gnaw with ease the hard vegetable substances upon which they principally feed, such as nuts, grains, and the bark of trees. The *rodents*, as they are frequently called, include about twenty families and several thousand species, such as the mice, rats, squirrels, beavers, agouti, rabbits, and lemmings. Most of the species are covered with fur, but some, as the porcupine, have spines. Some are aquatic, as the muskrat, and some live largely in trees, as several species of squirrels, but the greater number live upon or burrow in the ground. While many are injurious to agriculture or obnoxious pests to dwellings, many are valuable for the fur they bear. In these animals the brain is small, especially in those that feed strictly on herbs, but most of the species are characterized by great vigor and activity. Many fossil remains of rodents are found from the earliest Tertiary epoch, including many species that differ from the animals now in existence.

RODGERS (rôj'êrz), **John**, naval officer, born in Hartford County, Maryland, Aug. 8, 1812; died in Washington, D. C., May 12, 1882. He was a son of Capt. John Rodgers (1771-1838), who attained distinction by firing the first shot of the War of 1812. In 1828 he entered the navy and in 1853 secured command of the steamer *John Hancock*, then sent on an exploring expedition to the North Pacific. He commanded the monitor *Weehawken* in 1863, when that vessel captured the Confederate ironclad *Atlanta*, and was made commodore for his services. In 1869 he was given command of the China fleet, as rear admiral and two years later captured several forts in Corea, thus ending the outrages perpetrated on American commerce off the Korean shore. He served as commander of Mare Island navy yard at San Francisco from 1873 to 1877, and in the latter year became superintendent of the United States Naval Observatory at Washington, a position he held until his death.

RODIN (rô-dăn'), **Auguste**, sculptor, born in Paris, France, in 1840. He descended from poor parents and became a marble worker. Afterward he became associated with an artist in the decoration of the chamber of commerce at Brussels. In 1875 he exhibited in the Salon and two years later produced a statue in plaster. While his early work met with much adverse criticism, he succeeded in attaining a reputation by improving on his early productions, especially in giving them a lifelike appearance and accuracy in details. He executed many busts that have been greatly admired, including those of Rochefort and Victor Hugo. Among his general productions are "The Kiss," "The Age of Brass," and "Saint John Preaching," now in the Luxembourg. He died Nov. 17, 1917.

RODMAN, **Thomas Jefferson**, soldier and

inventor, born in Salem, Ind., July 30, 1815; died in Rock Island, Ill., June 7, 1871. He graduated from the West Point Military Academy, in 1841, and was immediately appointed lieutenant of ordnance. After experimenting with guns and gunpowder, he discovered a plan for casting large guns and cooling them from the inside. He is the inventor of several smooth-bore guns of large size and introduced mammoth powder as an effective agent. Guns of his invention were used in the army and navy during the Civil War and he had charge of the Watertown arsenal until 1865, when he was engaged to construct an arsenal on Rock Island, in the Mississippi, near Rock Island, Ill. He wrote "Experiments on Metals for Cannon and on Cannon-Powder."

ROE, Edward Payson, novelist, born in New Windsor, N. Y., March 7, 1838; died in Cornwall, N. Y., July 19, 1888. He studied at Williams College and later took a course at the Union Theological Seminary in New York City. After serving as chaplain in the Union army from 1862 until 1865, he settled as pastor of a Presbyterian Church in Highland Falls, N. Y., and in 1874 removed to Cornwall to devote himself to literature and the cultivation of small fruits. His novels are of considerable merit and have been read extensively in America and Europe. The first work from his pen, "Barriers Burned Away," appeared in 1872, and is a story of the Chicago fire. Other works embrace "Opening of a Chestnut Burr," "Nature's Serial Story," "He Fell in Love With His Wife," and "Miss Lou." "Success with Small Fruits" is a work on gardening, for which he gathered material from his own experience.

ROEBLING (rōb'ling), **Washington Augustus**, civil engineer, born at Saxonburg, Pa., May 26, 1837. His father, John A. Roebling, was a German-American engineer and established extensive works at Trenton, N. J. The son graduated at Rensselaer Polytechnic Institute in Troy, N. Y., in 1857, and aided his father in building the suspension bridge across the Allegheny River. At the beginning of the Civil War he enlisted in a New York artillery company, was for some time on the staff of General Pope, and served as military engineer and bridge builder. He constructed a bridge across the Shenandoah River at Harper's Ferry in the second Bull Run campaign. Shortly after the war he superintended the construction of the railroad suspension bridge across the Ohio between Cincinnati and Covington, and in 1869 was given charge and superintendency of the New York and Brooklyn bridge. This immense structure had been commenced by his father, who died from an injury received while at work, and it was completed in 1883. He died April 14, 1912, losing his life in the wreck of the *Titanic* off Newfoundland.

ROEBUCK (rō'būk), or **Roedeer**, a species of deer native to the mountains of Southern

Europe. It is found only in the timbered highlands. Its weight is sixty pounds and it is about thirty inches high at the shoulders. The color is tawny-brown. Its tail is almost concealed in the hair and is characterized by a large, white anal disk. The horns are seldom over nine inches long and the flesh is valued as food, being considered better than that of the stag.

RÖENTGEN (rēnt'gen), **William Conrad**, German physicist, born in Holland, March 27, 1845. He graduated from the University of Zurich in 1870, but when his favorite professor, Dr. Kundt, removed to Würzburg, he followed him to that city. In 1873 he removed to Strassburg, where he was made assistant professor. He became professor of mathematics and physics in the Agricultural Academy of Hohenheim in 1875, but returned to Strassburg University the following year. He was made professor and director of the University and Institute of Physics in Gießen in 1879, and in 1888 became professor of physics at Würzburg, Bavaria. Röntgen is the author of several works treating on the branches taught by him and the writer of numerous treatises for papers and magazines. In 1895 he attended the Würzburg Physico-Medical Society and announced a new kind of ray, which he called the *X-Ray*. This discovery of seeing and photographing what is ordinarily unseen excited universal attention, and is one of the greatest achievements of the latter part of the last century, its application in many respects being of great value. He was soon after summoned before the Emperor of Germany to exhibit his discovery, and was permitted to make a shadowgraph of the bones of the emperor's arms. The emperor soon after decorated Röntgen with the Order of the Royal Crown, and he was created a baron by Ludwig of Bavaria. Other discoveries made by him relate to the method of determining the intensity of sunlight, to the transmission of electricity through gases, and to the theory of flame sounds. See **X-Rays**.



W. C. RÖENTGEN.

ROGATION DAYS (rō-gā'shūn), the three days immediately preceding Ascension Day; hence, they always occur on Monday, Tuesday, and Wednesday. They are observed with litanies, and in some places with processions, to obtain God's blessing on the crops and to invoke His assistance in times of public peril.

ROGERS (rōj'ērz), **Henry Wade**, jurist and educator, born in Holland Patent, N. Y.,

Oct. 10, 1853. He graduated from the University of Michigan in 1874, was admitted to the bar, and was dean of the same school a number of years. In 1890 he was elected president of Northwestern University, Evanston, Ill., where he served efficiently until 1901, when he was made professor of law in Yale Law School, and became dean of the same in 1904. His publications include "Illinois Citations" and "Expert Testimony."

ROGERS, John, sculptor, born in Salem, Mass., Oct. 30, 1829; died July 27, 1904. He was educated in his native city and at the Boston high school, after which he engaged as clerk in a mercantile house, but was compelled to change his occupation on account of weak eyesight. Soon after he was employed in a machine shop at Manchester, N. H., and in 1856 took charge of a railroad repair shop at Hannibal, Mo., where he practiced modeling in clay. He went to Europe to study art in 1858, and the following year went to Chicago, where he modeled his celebrated "Checker Players." His largest work is the equestrian statue of Gen. J. F. Reynolds, now before the City Hall in Philadelphia. His productions embrace many statues incident to the Civil War and home life. They include "The Slave Auction," "One More Shot," "Picket Guard," "Going for the Cows," "Coming to the Parson," and "The Favorite Scholar." A bronze group illustrating Irving's "Legends of Sleepy Hollow" is his finest work.

ROGERS, Randolph, sculptor, born in Waterloo, N. Y., July 6, 1825; died in Rome, Italy, Jan. 15, 1892. After attending the public schools, he engaged in mercantile pursuits, but in 1848 went to Europe to study sculpture for two years in Rome. After returning to the United States, in 1850, he conducted a studio in New York City until 1855, when he returned to Italy. His works are among the best known of those produced by American sculptors. They include "Genius of Connecticut," on the State capitol at Hartford; statue of John Adams, in Mount Auburn Cemetery; statue of William H. Seward, on Broadway, New York City; statue of Abraham Lincoln, in Philadelphia; and "Angel of Resurrection," on the monument to Col. Samuel Colt, in Hartford, Conn. The bas-reliefs representing scenes from the life of Columbus, now on the bronze doors of the capitol at Washington, are also by Rogers. Other productions include "The Lost Pleiad," "Group of Indians," "Boys Skating," "Ruth," and "Isaac." He executed portrait statues of Abraham Lincoln and William H. Seward.

ROGERS, Samuel, poet, born in London, England, July 30, 1763; died Sept. 18, 1855. He was the son of a London banker and, after receiving a careful education, entered his father's establishment as a clerk. In 1793 he became head of the firm. His first poetic work, "An Ode to Superstition," was published in 1786 and his best work appeared in 1792, entitled "Pleasures

of Memory." Soon after he retired from business, having accumulated considerable wealth, and devoted the remainder of his time to literary study and travel in Europe. His later productions include "Human Life," "Epistles to a Friend," "Voyage of Columbus," and "Table Talk." His writings possess considerable value, but they are not read extensively.

ROHLFS (rölfs), **Anna Katherine Green**, novelist, born in Brooklyn, N. Y., Nov. 11, 1846. She graduated at Ripley Female College, Poughkeepsie, N. Y., and soon became popular as a writer of novels. In 1884 she married Charles Rohlf, but is more extensively known by her maiden name. Her first production to attract wide attention is "The Leavenworth Case," in which she gives evidence of much knowledge concerning the work of detectives and criminal law. It has been dramatized and presented to large audiences. Other writings include "The Lost Man's Lane," "The Millionaire Baby," "The Mill Mystery," "That Affair Next Door," "The Sword of Damocles," and "The Filigree Ball."

ROHLFS, Friedrich Gerhard, German traveler, born in Vegesack, Germany, April 14, 1831; died June 3, 1896. After graduating from a medical institution of Berlin, he engaged with the French army in Algeria as surgeon, and in 1860 entered upon an expedition of discovery in Morocco. He made extensive tours through North Africa from 1863 to 1865, and two years later joined the English expedition against Abyssinia. He traveled in Cyrenaica in 1868, and with the support of the Khedive of Egypt made an expedition into the Libyan Desert in 1873. From 1875 to 1876 he traveled in North America, visited the African Kufra oasis in 1878, and made a tour of Abyssinia in 1880. He was German consul general at Zanzibar in 1885, but returned to Germany the following year and took up his residence in Weimar. His writings include "From Tripoli to Alexandria," "Journey Through Morocco," "Diagonally Across Africa," "My Mission to Abyssinia," "Discoveries and Explorations in Africa," and "Land and People of Africa."

ROJESTVENSKY, Sinovi Petrovich, naval commander, born in 1848; died July 19, 1908. He entered the naval service at an early age, was rapidly promoted, and distinguished himself in the Russo-Turkish War. During the war between China and Japan, in 1894, he witnessed a number of the leading engagements. He was promoted to be rear admiral in 1902 and two years later became commander of the Baltic fleet. During the war between Russia and Japan he commanded the same fleet and on May, 27, 1905, was encountered in the sea of Japan by the Japanese fleet under Admiral Togo, who defeated him. In this engagement his flagship and seventeen other vessels of the Russian fleet were sunk. Subsequent to the war he was made vice admiral. His death occurred at German Spa, on the Baltic, from the effect of heart trouble.

ROLAND (rō'land), or **Orlando**, the celebrated knight of the court of Charlemagne, who is famous as a hero of romance. Tradition places him in the relation of nephew to Charlemagne and his character is portrayed as that of a loyal warrior, both skillful and brave. Little is known of him and writers have gone so far as to assert that it is altogether uncertain whether Roland represents a real or an imaginary person. We learn both from German and Frankish literature that Charlemagne was at Paderborn in 778, where he was busied in establishing civil government among the Saxons and attending to their admission into the Christian church. He was visited while there by a Saracen chief, who proposed to deliver a region south of the Pyrenees to the Franks, which proposition was at once accepted by the great commander.

Agreeable to the understanding, Charlemagne marched at the head of a large army into Gascony, where he compelled Duke Loup to do him homage, and annexed Pampelona and Saragossa. After finding that the Saracen ally could render but little assistance, Charlemagne decided to return to France, and while slowly threading through the valley of Roncesvalles the rear guard was attacked by a large body of Gascons. Roland immediately rushed to the defense, but in a most gallant fight was slain while leading his troops. This incident was the occasion of the celebrated "Song of Roland," which has remained an interesting piece of literature. It was sung at the head of the Frankish troops for centuries. A notable instance is the conquest of England by William of Normandy, when it was sung by the marching columns to keep them in good cheer. Visitors in the Pyrenees are still shown the place that was the scene of the exploits of Roland, and his story is one that still passes current among the hardy mountaineers.

ROLAND, Marie Jeanne, eminent lady of France, born in Paris, March 17, 1754; guillotined Nov. 9, 1793. She was the daughter of Pierre Gratien Philipon, an engraver, who lost his money by speculation, while her mother died at an early age. She was endowed by nature with great beauty and intellectual strength, and from childhood possessed a remarkable interest in study and reading. In 1780 she married Jean Marie Roland (1734-1793), a French minister of the revolutionary period, who is celebrated as the leader of the Girondists. Her husband became minister of the interior in 1792, but was compelled to flee from the turbulent scenes occurring in Paris the following year, finding safety at Rouen.

Madame Roland had been a conspicuous and influential figure among many of the leading statesmen, such as Buzot, Gironde, Brissot, and Petion. In the earlier period of the revolution she was on terms of friendship with Danton and Robespierre. It is not hard to understand how suspicion would attach to her as an influential factor in forming the policy of the Girondists,

especially since her husband had fled from the scene of excitement, and she was accordingly placed under arrest on May 31, 1793. Though an avowed advocate of the establishment of a republic, she was released in June, but shortly after was rearrested and in November was brought to the guillotine. Her last words were "O Liberty, what crimes are committed in thy name!" Her husband became entirely prostrate on hearing of the execution and committed suicide on Nov. 15, 1793.

ROLFE (rölf), **John**, colonist, born in Norfolk, England, in 1585; died in 1622. He left England with a company of colonists in 1609, but was detained several months in the Bermuda Islands and reached Virginia in 1610. Some writers contend that he introduced the cultivation of tobacco in America. In 1608 he married an English lady, who died in 1610, and three years later he married Pocahontas, the daughter of Powhatan. He and his wife made a trip to England in 1616, where Pocahontas died the next year. He returned to America soon after and became prominent in the early government of Virginia.

ROLFE, William James, editor and author, born in Newburyport, Mass., Dec. 10, 1827. He was educated at Amherst College, but left before graduating and engaged as school-teacher in Cambridge, Mass. In 1869 he became editor of the *Popular Science News*, but devoted much time to writing school text-books and editing poetical works. Harvard University granted him the degree of master of arts in 1859. The same degree was granted to him by Amherst in 1865 and the degree of doctor of literature in 1887. Rolfe traveled extensively in Europe. In 1892 he visited Tennyson at Aldworth and in the same year published an account of the visit in *The Critic*. Among his writings is "Cambridge Course of Physics," in six volumes. He edited Craik's "The English of Shakespeare" and Lamb's "Tales from Shakespeare." He died July 7, 1910.

ROLLING MILL, an establishment in which metal is made into desired forms by being worked between pairs of rollers. The crude iron ore taken from the mine by blasting is transferred to the rolling mill, where it is puddled and rolled. Puddling involves heating by means of a furnace, whereby such impurities as sulphur, carbon, silicon, and others are separated from the iron. The separation takes place while the ore is in a melted condition, the iron forming into granules as the mass is stirred by the puddlers with an iron rod or by machinery. When a bulk of molten iron has collected by the union of granules, it is taken to the hammer, where it is formed into balls. Thus heated and balled, it is made into bars or sheets by the rolling mill.

This machine consists of one or more pairs of iron rollers, so adjusted that they may be set nearly in contact by means of set screws. The

rollers are supplied with grooves so made that the desired form is given to the heated iron as it passes between them. It is gradually decreased in size and increased in length in the process of passing through the rollers, by reason of each roller having a series of grooves gradually decreasing in size toward one end. The process differs somewhat according to the product desired. Generally the ore is passed through the mill two different times. The first time it is worked to remove the impurities remaining after puddling, after which the iron is reheated and passed through the mill a second time to form it into bars, sheets, rails, hoops, or any form desired.

ROMAN CATHOLIC CHURCH, the denomination of Christians that recognizes the Pope or Bishop of Rome as its visible head, which assumes to be the only catholic and apostolic church. The word catholic, meaning *universal*, was used by early Christians and continued to be the common designation of the vast number of Christians throughout the Middle Ages. Protestants refused to admit that the church which they left is entitled to call itself Catholic in the sense in which the term is used. From the beginning of the Reformation they prefixed the adjective *Roman*, while the Catholics claim the designation *Catholic* without a qualifying adjective. Theoretically the Roman Catholic Church claims spiritual authority on earth. This claim is based on the belief that Christ conferred upon Peter a primacy of jurisdiction, that Peter fixed his see at Rome, and that the bishops of Rome have succeeded him in his prerogatives of supremacy. This view is strengthened by Catholic historians in that they refer to Rome as a center at which appeals from other churches on matters of doctrine and discipline were decided, bishops were nominated, and heresies were condemned. However, Protestant historians question whether Peter fixed his see at Rome. They regard the superiority of Rome as a center largely the result of its political and social power.

The teachings of the Roman Catholic Church are based on the Scriptures and tradition. They are set forth distinctly in the Apostles' Creed, the Nicene Creed, and the Athanasian Creed. To these Pope Pius IV., in 1564, added the articles on the invocation of saints, on entire transubstantiation of the eucharistic elements in the body and blood of Christ, and others that distinguish it largely from the Protestant creeds and those of other Christian sects. Seven sacraments are recognized, those of baptism, confirmation, the eucharist, penance, holy orders, matrimony, and extreme unction. In 1854 the dogma of the immaculate conception of the Virgin Mary was added and in 1870, that of papal infallibility.

Roman Catholics believe in the existence of a purgatory and the necessity of confession, and make a clear distinction between doctrine and discipline. *Doctrine* is held to be embodied in

the teachings of Christ and his disciples. On the other hand, *discipline* includes the rules laid down for the government of the church by the councils, the religious observances and practices, the administration of sacraments, and confessions and fasting. The membership of the church consists of all persons who, having been baptized, hold to its doctrines and recognized jurisdiction.

The Pope is chosen for life by the College of Cardinals. He is the center of unity and the supreme head, and without his consent no bishop can be consecrated. Cardinals at the head of congregations direct the administration of the church, and these answer to ministers established in Rome by papal authority. In the Western churches the clergy are bound by a vow of celibacy, but in the Armenian and Greek branches orders are granted to persons married, but marriage after ordination is forbidden. Celibacy is practiced by all the monks and nuns.

A vast monastic system is maintained, which comprises orders known as seculars and religious. Each has its own superiors and is responsible directly to the Pope or to the bishops. Among these orders are the Franciscans, Augustinians, Carmelites, Capuchins, Dominicans, Carthusians, and Jesuits. The missionary work of the Catholic Church takes high rank in all countries of the world, through which means it has promoted a high standard of morality. Latin is used almost exclusively in all recognized rites in America, Europe, and the missionary jurisdictions, but various other languages are employed in the East, as Coptic, Greek, Armenian, and Syro-Chaldaean.

The total membership of the Roman Catholic Church in the United States, in 1917, was given at 14,330,370. In the same year it had 15,704 churches, 20,962 priests, and 68 institutions of higher learning. These institutions were attended by 6,042 students. In addition to these it had 4,031 parish schools, with 884,680 pupils. In 1917 there were 2,005 Roman Catholic churches and 2,840,780 communicants in Canada. The total Roman Catholic population of the world is placed at 272,860,000. See **Pope**.

ROMANCE (rô-măns'), the name of a class of literature which originated among the people who employ the Romance languages, that is, the French, Italians, and Spaniards. It is distinguished by comprising a class of literature of fiction, either prose or verse, in which the marvelous or uncommon incidents are prominent. As a branch of literature it belongs essentially to the Middle Ages and first attained prominence during the four centuries of knighthood, but became especially popular in the 15th and 16th centuries. While many of the Greek writings represented men and incidents as they were believed to be, the *Odyssey* is a series of marvelous tales of an essentially romantic character. This and other writings were followed more or less in the verse romance of the Middle Ages, and

from its original seat in Southern Europe it finally extended to the western and northern countries.

Geoffrey of Monmouth published his Latin work entitled "Historia," which was revived and republished in its present form in 1147. Soon after it was translated into French and versified. The romances of Arthur published in this work induced literary interest on the continent as well as in England, where Arthur became a national hero of romance and a leading figure around whom might be grouped the adventures of subordinate knights. French writers treated Charlemagne in much the same manner, but he had the advantage of being a more distinct historical character than Arthur. Other heroes of romance include Alexander, Guy of Warwick, Roland, and Havelok de Dane. In the German *Nibelungenlied*, the Anglo-Saxon *Beowulf*, and the Spanish *Amadis de Gaula* we have other examples of heroes who figured in romance. Among the latter English productions that belong to this class of literature may be mentioned the historical romances of Sir Walter Scott and a host of writers who succeeded him, such as Robert Louis Stevenson and Alfred Tennyson. Besides furnishing a distinct class of literature of fiction, romance has exercised a more or less wide influence upon the development of the novel.

ROMANCE LANGUAGE, the name applied to the spoken language in the southern part of Europe from the 10th to the 14th century. It was composed of a corrupt form of the Latin. While some writers treat the languages that grew out of the corruption of the Latin as a distinct tongue, it is generally conceded that there was no uniform general language of this character, but the dialects spoken were of great similarity. Provençal is the most important branch of this period, but it is followed closely by the Wallachia and Romansh.

The term *Romance languages* is generally applied by recent writers to the spoken and written tongues that had their origin in the Latin, or which owe their development to the extension of the dominion and civilization of the Romans. At present not less than seven of these languages are used more or less extensively. These include the Italian, Spanish, Portuguese, Provençal, French, Ladino, and Rumanian. *Italian* is harmonious in form and is distinguished by the rich fullness of its tones. *Spanish* is peculiar for its short, distinct sounds, fixed tones, and the adoption of Arabic words. *Portuguese* is the western dialect of the Spanish and has almost the same words, but the pronunciation is in the style of the French. Grace and delicacy characterize the *French*, which is the most historical of the Roman languages, and *Provençal* is closely related to it. *Ladino* is spoken along the Adriatic, is also called *Romansh*, and lacks uniformity in orthography and pronunciation. *Rumanian* is the language of Rumania, but is

thought to have come from the northern part of Italy rather than from the Roman colonists of Dacia. All of these languages have elements in common with Latin, hence the study of the latter is helpful in the mastery of the others.

ROMANS, Epistle to the, a book of the New Testament, written by Saint Paul to the church of Rome. It was probably written at Corinth, where Saint Paul remained about three months, and is assigned by commentators to the year 58 or 59 A. D. The epistle consists of two principal parts, one of which is argumentative and the other is hortatory. It contains a complete statement of the doctrine held by the writer, including justification by faith as a means of salvation to all men, Gentiles as well as Jews. He deplores the fact that many Jews rejected Christ, and admonishes the Romans to embrace the spirit of humility, which will enable the strong to bear with the weak. The book is concluded with various salutations and directions. The authenticity of the epistle has been conceded by practically all writers.

ROMANTICISM (rô-măn'tī-sīz'm), the name applied to the productions of a school of writers who sought to revive certain forms and methods in opposition to the classical style. The latter had its origin in the literature of Greece and Rome, while romanticism relates more especially to the writings that belong to the nations of Western Europe. In Germany the name romantic was introduced to designate the poetry which resulted from chivalry and Christianity. In general the terms *classic* and *romantic* have reference to treatment, not to subject, and the difference is that in the classic the treatment is with the view of representing the idea as directly and with as exact an adaption of form as possible, while the romantic leaves the reader to discover the idea from suggestions and symbols. The classic form is adversely criticized in that it does not appeal to the imaginative faculty.

Lessing and Herder are among the leading opponents to the classic ideas in German literature. The movement had a supporter in Goethe, whose "Sorrows of Werter" is a fine example of the romantic style. Other German writers of this class include Novalis, Tieck, Schlegel, Schelling, and Schleiermacher. Victor Hugo is one of the leading romantic writers of France and his "Odes and Ballads" is his finest example. The English writers of this school are very numerous and are represented by Thomson, Keats, Scott, Byron, Burns, Coleridge, Pope, and Wordsworth. At least two essentials characterize romanticism, the first is a love of the picturesque and the other is a spirit of unconscious reaction to the writings of the period that immediately preceded.

ROMAN WALLS, the remains of lines of defense constructed by the Romans in various parts of Europe. The most noted of these structures is on the frontier between the Rhine and

the Danube, known by the Romans as the *Limes*. It extended from Hienheim on the Danube, near Ratisbon, Germany, almost due west to Stuttgart. Another wall of this kind extended from Rheinbrohl, on the Rhine, in a direction toward the southeast, to the border of Rhaetia. These structures were mostly of stone, but in some places they were in the form of earthworks protected by ditches. A similar wall was erected to protect the northern boundary of Britain. Another wall was built of turf from the Solway to Newcastle-on-the-Tyne. It was about eighty miles long and was completed in the year 120 A. D. by Hadrian. Septimius Severus, about 90 years later, replaced the turf structure with a stone wall, and this may be traced at the present time. It was built as a means of defense against the Picts and Scots.

ROME, a city in Georgia, county seat of Floyd County, on the Coosa River, which is formed here by the junction of the Etowah and the Oostanaula rivers, sixty miles south of Chattanooga, Tenn. It is on the Southern, the Central of Georgia, the Nashville, Chattanooga and Saint Louis and other railroads. The surrounding country is fertile, producing cotton, fruit, and cereals. This is the seat of Shorter College for Women, a Baptist institution. Other features include the county courthouse, the Federal building, the public library, the Hearn Institute, the Everett Springs Seminary, and Mobley Park. It has systems of waterworks and sanitary sewerage, brick and macadam pavements, and electric street railways. Among the manufactures are cotton goods, furniture, leather, farming implements, and machinery. It was chartered as a city in 1847. At the time of the Civil War it was captured by a Federal force. Population, 1900, 7,291; in 1920, 13,252.

ROME, a city of New York, in Oneida County, on the Mohawk River and the Erie Canal, fifteen miles northwest of Utica. It is on the New York Central, the New York, Ontario and Western, and other railroads. The surrounding country produces large quantities of grain, cheese, butter, hops, and fruit. The chief buildings include the Jervis Library, the high school, the Saint Peter's Academy, the Y. M. C. A. building, the State Custodian Asylum, and many fine churches. It has well graded and paved streets, electric street railways, and systems of public waterworks and sanitary sewerage. Among the manufactures are engines, furniture, ironware, machinery, saddlery, glue, cigars, and wire. Rome occupies the site of Fort Stanwick and near it the battle of Oriskany was fought. The place was incorporated as a town in 1796 and was chartered as a city in 1870. Population, 1905, 16,567; in 1920, 26,341.

ROME, a city of Europe, the capital of Italy, formerly the capital of the Roman kingdom, republic, and empire. It is situated on the Tiber River, about fifteen miles from the sea, being partly on a plain and partly on the slopes of the

famous Seven Hills. Formerly it was unhealthful, being in the Campagna, but now it is one of the most sanitary cities of Europe. The range of temperature is from 23° to 99° and the climate is less severe than that of Florence.

ANCIENT ROME. The early history contains much of interest, since it was not only one of the most important cities of the ancients, but has long been noted as a religious center of western Christendom. According to tradition, the city was founded by Romulus and Remus, two sons of Rhea Silvia, a priestess of the goddess Vesta, and of Mars, the god of war. These two children were ordered thrown into the Tiber by a usurper, but were cast ashore at the foot of Mount Palatine, where they were nursed by a wolf, but afterward they were rescued and brought up as the children of one Faustus. The city was named after Romulus, who became its first king.

The founding of ancient Rome is generally placed at 754 B. C. and the founders are regarded as Latins, who left Alba Longa in a colony to establish an outpost against the Etruscans. No reliable account of the early history of Rome is in existence, as the records were burned when the city was destroyed by the Gauls in 390 B. C. The early inhabitants were shepherds or farmers, who tilled the land upon the plain near by, but lived for protection within their fortifications on Palatine Hill. At the time the Gauls destroyed the city, they left most of the buildings in ruin, and it was hastily rebuilt without planning for regularity in its streets. The leading thoroughfares remained narrow and crooked in many parts of Rome until Augustus Caesar became emperor, in 31 B. C. He beautified the city by adorning it with monuments and works of art so that it was said of him, "He found the city of brick, and left it of marble." However, the groundwork for a great city was laid long before his time. The low places between the hills were improved by grading in the early history of the city, when also a huge system of drainage was constructed. The great aqueducts were begun by Appius Claudius Caecus in 312 B. C., by which water was brought to the city from springs seven miles distant, and material additions were made until fourteen aqueducts were completed. These had a length of 300 miles. They still form a very interesting feature of modern Rome.

The Campus Martius was originally a marshy tract lying between Capitoline Hill and the Tiber. It was so named because of its use for military exercises. In this stood the theater of Pompey, an immense structure with a seating capacity for 40,000 persons. On Capitoline Hill was the splendid temple of Jupiter Capitolinus, called the *Capitol*. Near it was the theater of Marcellus, finished by Augustus in 11 B. C., and also the Colosseum, an immense oval building used for gladiatorial exhibitions, in which many Christian martyrs suffered death. It was about

600 feet long by 500 feet wide, and had a height of 160 feet. Its capacity was ample for 87,000 spectators. The largest structure was known as the Circus Maximus, situated between the Palatine Hill and the Aventine Hill, and had a seating capacity for 250,000 persons. The Circus Maximus has been long destroyed, but the ruins of the Colosseum are still to be seen.

Ancient Rome had numerous public baths, the largest being the *Thermae of Titus*, traces of which remain on Esquiline Hill. The famous Diocletian bath was the largest and most magnificent, and a portion of it is now used as a church. Its buildings included many large and substantially constructed palaces, temples, and private residences. The most noted temples were the Temple of Venus, built by Caesar; the Temple of Peace, a magnificent structure built by Vespasian; and the Temple of the Sun, erected by Aurelian. Near the Forum are the triumphal arches of Severus, Titus, and Constantine, while that of Drusus is in the Appian Way. The beautiful Trajan pillar in the Forum is still standing. Remains of catacombs, subterranean galleries used as burial and meeting places, and remnants of street pavements, may still be seen in many parts of the city. The Tiber was spanned by a dozen substantial bridges, eight or nine of which are intact. It is estimated that the population of Rome in time of Augustus was 1,300,000, but in the time of Trajan it is said to have reached about 2,000,000.

MODERN ROME. At present Rome extends to both sides of the Tiber, as did the ancient city. However, it is difficult to determine whether the limits coincide with those of Ancient Rome, when they probably extended some distance beyond the present boundary, especially in some directions. It has substantial walls, those on the east bank of the Tiber dating from the time of Aurelian, in the 3d century. The city has been improved remarkably since it became the capital of United Italy, its streets having been not only extended and straightened, but material improvements having been added in the way of sewerage, paving, electric lighting, and rapid transit. Embankments have been constructed along the Tiber to prevent overflows, thus guarding against damages and disease common to the city in former times. Through the medium of vast excavations it has been possible to restore many historic structures and monuments, notably the Forum Romanus, the Temple of Castor and Pollux, and the famous Sacred Way, which was the great central street of the ancient city. Many alterations and improvements have been made in the piazzas, parks, and boulevards, while monuments of modern structure have been dedicated to representative statesmen of modern Italy.

BUILDINGS. The most notable building in Rome is the Church of Saint Peter, which is considered the finest structure of the kind in the world. It is decorated by monuments and paint-

ings by the great masters. Besides this place of worship, the city has about 325 churches. Many of these are memorial churches and are opened only on the day of the year assigned to the saint to whom they are dedicated. The Vatican adjoins Saint Peter's and is the palace of the popes. It contains the Vatican library, a picture gallery, and splendid museums. The palace on the Quirinal, formerly a summer residence of the popes, has been occupied by the King of Italy since 1870, but the Palazzo della Cancelleria is still occupied by those in connection with the Roman Catholic Church. Rome is noted for many great educational institutions, the most important being the university founded by Pope Boniface VIII., in 1303. It has departments of physics, zoölogy, mineralogy, botany, astronomy, anatomy, law, medicine, and theology. Among the equipments are included a fine collection of apparatus, botanic gardens, and an astronomical observatory. It is attended by about 2,350 students. Rome has a system of common schools, which is maintained by public grants and taxation, but the instruction is chiefly in parochial schools and monastic institutions. The city is the seat of numerous hospitals, charitable institutions, academies, and many large libraries.

LATER HISTORY. Rome was identified with the rule of the popes from the downfall of the Roman Empire, in 476 A. D., until the rise of United Italy, in 1871. An army under the constable of Bourbon captured and sacked the city in 1527, and Napoleon occupied it in 1798. He made Pope Pius VI. a prisoner and carried him to France, and soon after a Roman republic was established. A republican army under Garibaldi and Mazzini expelled Pope Pius IX. from Rome in 1848, but he was restored to power by a French army sent the following year to consummate the overthrow of the new republic. With the fall of the French Empire in 1871, new life was enkindled for the union of the Italian states. In July of the same year the city became the capital of United Italy, when the king, Victor Emmanuel, took up his residence in the Quirinal. Population, 1916, 590,960.

INDUSTRIES. As compared with other cities of the same size, Rome is not important as a center of commerce and industries. It is the converging center of several railroads, but has only a very limited trade by navigation, since the Tiber is navigable only for small vessels. Grain, wine, and cattle are imported. Most of the export trade is carried on by way of Fiumicino, its seaport on the Mediterranean, with which it is connected by railway. Among the manufactures are silk and woolen goods, earthenware, toys, jewelry, musical instruments, leather, flour, soap, macaroni, and artificial flowers. Large quantities of art products are made, such as cameos, mosaics, bronzes, and church ornaments. Rome is a gathering place for tourists and travelers, who come here to view its histor-

ical treasures. It is the Mecca that attracts students to study its paintings and sculptures.

ROME, an ancient nation of Southern Europe, one of the most powerful and historic of antiquity. The history extends from the founding of the city of Rome, in 754 B. C., to its downfall, in 476 A. D., over twelve centuries. This long expanse of time may be divided into three periods, according to the form of its government. They include the kingdom from 754 to 509 B. C., the republic from 509 to 31 B. C., and the empire from 31 B. C. to 476 A. D. It is thought that the Latins who founded Rome came as a colony from Alba Longa, and that the latter city was founded by Ascanius, a descendent from fugitive Trojans.

EARLY HISTORY. Many accounts have been published in regard to the founding of Rome, but the one most generally accepted is that the destruction of Troy by the Grecians caused many fugitive Trojans to flee to Italy, where they were received kindly by King Latinus. Rhea Silvia, daughter of a deposed King of Italy, was the mother of Romulus and Remus, two children who were designed to be killed by the reigning king, but they were discovered and reared by a shepherd. Romulus became the founder of Rome, in 754 B. C., and was the first of the kings. He encouraged settlements by constructing fortifications to protect the citizens against hostile tribes, building them in such a manner that the people could reside within the fortifications while they tilled the soil and reared their herds in the adjoining region. It is probably true that the early settlements were greatly enlarged by Aryans coming from Asia by way of Greece, and that the cities of Latium formed a confederacy with Alba Longa at its head. The settlements grew rapidly, expansion being due largely to the fertility of the soil and natural advantages in the way of river and sea navigation.

KINGDOM OF ROME. The early government of Rome was aristocratic, being administered under a priest-king, who was assisted by a senate and an assembly. However, the city was frequently attacked by the Sabines, a tribe occupying the upper valley of the Tiber, and afterwards they captured the Quirinal and Capitoline hills. After many years of conflict the two tribes became united and formed the two parties known as the *Romans* and the *Quirites*, both having seats in the senate, while the king was taken alternately from each. Later the city was conquered by the Etruscans, who placed the Tarquins on the throne and ornamented the city with elegant structures in the Etruscan style of architecture. They extended the city to include the Seven Hills, inclosing the whole with a wall that endured eight centuries. It was due to the Etruscans that Rome became the head of the thirty Latin cities within 150 years after it was founded.

As the adjoining cities of Italy were con-

quered, many people of foreign birth were brought or removed into the city. This element gave rise to the *plebeians*, while the Latins, Sabines, and Etruscans constituted the class known as the *patricians*. However, the Tarquins were the friends of the plebeians. The nobles, becoming dissatisfied with the advance of the plebeian power and the corresponding restriction of the kings, joined other Latin cities to expel their Etruscan rulers, which they did in 509 B. C. The following is the chronology of the Roman kingdom, as generally given by historians: Romulus, 754-716; Numa Pompilius, 716-672; Tullus Hostilius, 672-640; Ancus Marcius, 640-616; Tarquinius Priscus, 616-578; Servius Tullius, 578-534; and Tarquinius Superbus, 534-509.

REPUBLIC OF ROME. With the establishment of the republic, in 509 B. C., two chief magistrates were chosen. These were at first called *praetors*, but the name was later changed to *consuls*, and a constitution modeled by Servius was adopted. Conflicts continued between the Romans and the Etruscans until 295 B. C., when the latter were not only subdued, but Rome became the master of all Italy. However, contests of a political character were constant between the patricians and the plebeians. The former were descendants from the first settlers, and were rich, proud, and exclusive, making a demand of all the offices and emoluments of the government. On the other hand, the plebeians were the common people. They were denied the rights of citizens and were not allowed to intermarry with the patricians. Besides, they were obliged to serve in the army without pay and their want of means to carry on industrial enterprises at home rendered them creditors to the patricians, who reduced them to a form of slavery and sold them as slaves when they became unable to pay their debts.

The plebeians urged their demand for equal privileges with the patricians for the first 200 years of the republic and gradually their demands were complied with, a consummation hastened by the fact that they formed the principal part of the army. In 445 the law against intermarriages was abolished. Soon after the plebeians were granted three military tribunes with consular powers and in 367 B. C. their victory was finally won, when they succeeded in rapid succession in securing the dictatorship, the censorship, the praetorship, and the right to be pontiff and augur.

The period of contest between the patricians and plebeians was disturbed more or less by foreign wars and internal strife among the different tribes. Rome was captured and nearly destroyed by the Gauls in 390 B. C., and the invaders agreed to recross the Apennines only on condition that they receive a heavy ransom. This invasion was in some respects beneficial to the Romans, since they were deeply impressed by the courage and strength of the Gauls, and

at once began to rebuild their city. The next war took place in 280-276 B. C., against Pyrrhus, a Grecian colony in southern Italy, which resulted in the subjugation of the latter. Thus triumphant at home, Rome entered upon the First Punic War, in 264, and continued this contest against Carthage until 241 B. C. The Second Punic War occurred in the period from 218 to 201 and the Third from 149 until 146 B. C. These wars with the Carthaginians and their attendant contests covered a period of about 100 years. Carthage, a city of Africa that had flourished over 700 years and numbered 700,000 inhabitants, was utterly destroyed and the Carthaginian territory became the Roman province of Africa. While Hannibal was commanding the Carthaginians he made a treaty with Philip, King of Macedon, and out of this grew three wars against the Macedonians, which culminated in the Battle of Pydna in 168 B. C. The results of these wars were reaped within a brief period and included the downfall of Greece. In 146 B. C. Macedon became a Roman province, Corinth fell the same year that Carthage was captured, and all of Greece was made the Roman province of Achaea. Thus victorious in Carthage and Greece, the Romans began to look toward the East for conquest. They had already defeated the Syrians at Thermopylae in 190 B. C. and had overthrown their power on the field of Magnesia, in Asia Minor.

The Roman nation extended its influence by the year 133 B. C. so as to include the vast region from the Atlantic to the Bosphorus, besides a part of Northern Africa and much of Western Asia. Its soldiers had come in contact with both civilized and savage opponents, while many parts of Italy had been swept with fire and the sword by Hannibal. Both of these circumstances had brought about material changes in economic conditions, since there was need for restoring rural prosperity, and the capital city needed a more rigid government. Conditions hastened on the civil wars, and Rome in rapid succession passed through conflicts that operated to destroy the republic. The first material internal disturbance arose over the measure introduced by Tiberius Gracchus in 123 B. C. This tribune sought to have the public land assigned in small farms to the natives with the view of giving every man a homestead, and proposed in addition that those receiving land should be allowed means from the public treasury to build houses and buy cattle. This measure was supported by all the friends of the common people, but it was opposed with great vigor by the nobles, and resulted in the assassination of Gracchus and his leading supporters by agents of the aristocracy. Soon after Jugurtha usurped the throne of Numidia, which occasioned the war against him in 118 B. C., known as the Jugurthine War.

The invasion of Rome by the Teutons and Cimbri began in 113 B. C. These were followed

by the Social War, due to the question of admitting Italians to citizenship, in 90 B. C.; the first Mithridatic War, in 88 B. C.; the Gladiatorial War, in 73 B. C.; and the great Mithridatic War, in 74 B. C. In the meantime occurred several wars resulting from disagreements among the generals and statesmen. The leading men of Rome at that period were Caesar, Crassus, Cicero, Octavianus, Pompey, and Cato the Stoic. The first triumvirate was concluded by Pompey, Crassus, and Caesar in 60 B. C., forming a compact so strong that they were able to manage the affairs of the republic at their pleasure, and it was cemented by Pompey marrying Julia, only daughter of Caesar. Soon after followed the banishment of Cicero and the appointment of Cato to Cyprus, while Caesar became consul and was afterward appointed as governor of Gaul. A civil war between Caesar and Pompey began in 49 B. C., and, though Pompey had boasted that he could raise an army by stamping his foot upon the ground, he was obliged to flee from Rome without striking a blow. A battle between the two rivals occurred on the plain of Pharsalia, Greece, in 48 B. C., which resulted in the defeat of Pompey and he was obliged to flee to Egypt, where he was assassinated. Cleopatra was elevated to the throne of the Ptolemies by Caesar and the Syrians were so completely defeated that Caesar sent his celebrated dispatch: "I came, I saw, I conquered." Victorious in the East, Caesar hastened to celebrate a four-days' triumph in Rome, where he was created dictator for ten years and censor for three. In the meantime he attained other victories and established peace in Spain.

The government of Caesar was administered honestly. During his administration canals and highways were built, the poor were given employment, Rome was enlarged and beautified, and his vast dominion from the Euphrates to the Rhine was guarded with remarkable vigor. The senate created him dictator for life, but differences and jealousies arose that finally terminated in his assassination in 44 B. C. Caesar's death was followed by the second triumvirate, which was concluded by Antony, Octavianus, and Lepidus. By its terms Brutus, Cicero, and Cassius were proscribed. Cicero was shortly after beheaded and Brutus and Cassius met their opponents in the Battle of Philippi in 42 B. C., but their complete defeat caused them to commit suicide in despair. Rome was divided between Octavianus and Antony, the former receiving the West and the latter the East. A civil war between the two great leaders terminated in the naval Battle of Actium, in which Antony and Cleopatra were defeated and fled to Egypt. With the Battle of Actium ended the civil wars and the Roman republic. Octavianus, now master of the civilized world, became Emperor of Rome in 31 B. C., and assumed the title of Augustus.

EMPIRE OF ROME. Although an empire had been established, Augustus made no radical changes, but kept all the forms of the republic. This course was necessary, since a radical assumption of power would have resulted in his deposition. However, he really exercised absolute sway and all the offices of trust were centered in him, including those of pro-consul, consul, censor, tribune, and high priest. The empire at that time contained 120,000,000 inhabitants. It extended from the Euphrates on the east to the Atlantic on the west, and from the deserts of Africa on the south to the Danube and Rhine on the north. Fully 100 different nations were included in this vast dominion, each speaking its own language and worshiping its own gods.

The Age of Augustus was one of general peace and prosperity. It was not only the design of the emperor to maintain schools, extend literature, and effect internal improvements, but also to Romanize his subjects. This had already been accomplished in Gaul and was under way in Germany, but Arminius, a brave leader of the Germans, aroused his countrymen in opposition. In the year 9 A. D., Varus and his entire army in Germany met destruction, and Roman authority never was fully re-established in the country of the Teutons. The most important historical event of his reign was the crucifixion of Christ at Jerusalem, under Pilate, then Roman procurator of Judaea. On the death of Augustus, in 14 A. D., Tiberius, his stepson, became emperor by a decree of the senate. The emperors succeeding Tiberius were Caligula; in 37; Nero, in 54; Vespasian, in 69; and Domitian, in 81. Domitian was succeeded by the five good emperors, Nerva, Trajan, Hadrian, Antonius Pius, and Aurelius, who reigned from 96 until 180 and gave Rome both peace and prosperity. Aurelius is regarded one of the most virtuous and wisest of earthly rulers, but the later years of his reign were disturbed by invasions of the Germans and the Slavs of Russia. He was succeeded by his son, Commodus, in 180, and from that time Rome began to decline.

The decline of Roman power is due to many causes. It may be said that the most prolific were the rise of factional militarism, the continuous invasions by the Goths, Germans, and Persians, the concentration of wealth into the hands of a few, and a low state of political and moral aptitude. During the 1st century Christianity spread rapidly over the Western Empire and became a potent force in displacing the gods of the Romans. Though tolerant of all religious beliefs in every nation they conquered, the Romans persecuted the Christians. This was due to the fact that they alone refused to offer sacrifice to the gods of the empire. They absented themselves from the games and feasts and were accustomed to hold their meetings at night. Soon they came to be

regarded enemies of the state and were persecuted by even the best rulers, as Trajan and Diocletian. Besides, a marked change came about in Roman citizenship, since the emperors were of provincial birth and the army consisted chiefly of Germans and Gauls.

Constantine was declared emperor by his troops in 306 and, after overthrowing five rival contestants for the throne, he became sole ruler in 324. His reign marked an era in the history of the world, for the reason that he established Christianity as the state religion and removed the capital from Rome to Byzantium, a Greek city on the Bosphorus, which was renamed Constantinople in his honor. He made the government absolutely despotic by establishing a court of titled nobility and weakened the power of the army. While Christianity made it possible for the empire to resist three centuries of barbaric invasions, it did not supply enduring strength. Julian the Apostate sought in vain to restore the old religion and Valens taxed every energy of the empire to repel the invading Goths, who pressed forward to the very gates of Constantinople, but he was captured and burned.

Theodosius the Great for a few years stayed the division of the empire by enlisting 40,000 Goths under the eagles of Rome, but at his death, in 395, a division occurred between his two sons. The Eastern, or Byzantine Empire, passed to his son Arcadius and the Western Empire, to Honorius. Continuous jealousies between the two empires greatly weakened both governments and, to save his dominion from ruin, Arcadius induced the invaders from the north to turn against Italy. The three great barbaric leaders were Alaric the Goth, Attila the Hun, and Genseric the Vandal. Alaric captured Rome in 410, while Attila swept like a scourge across Italy and only spared Rome from utter destruction, in 451, at the entreaties of Pope Leo. Genseric secured control of the Mediterranean and sailed up the Tiber in 455. Pope Leo met Genseric to entreat that the city might be spared, but he turned it over to the warriors to be sacked. He carried 30,000 slaves and vast treasures from Rome to Carthage, where he had founded an empire on the site of the city destroyed by the Romans six centuries before. Rome was now at the mercy of Odoacer, a German chief, who commanded that Romulus Augustulus, the last Roman monarch, lay down his useless scepter. The emperor yielded in 476, and thus passed away the great Roman Empire. It is a curious incident in history that both the founder and the last sovereign of Rome bore the name of Romulus. Byzantine continued a recognized nation for a thousand years after the fall of Rome, ending with the capture of Constantinople by Mohammed II., in 1453. Rome was a province of the Byzantine Empire until 800, when Charlemagne received its crown, though its history had be-

come merged into that of Italy some centuries before. See **Italy**, subhead HISTORY.

LANGUAGE. Politically there was a clear distinction between Rome and Latinum, but the language of the two sections was the same and it was called *Latin*. It belongs to the Aryan family of languages and was perhaps spoken in several dialects as early as 1500 B. C. It is probable that the Latin and Greek came originally from the same source, since there is a manifest connection between the two languages. Classical Latin was formed in the period when Rome was a republic and an empire, though during the last two centuries of its history many foreign words were injected through contact with other languages, and by the 8th century it ceased to be spoken as a distinct tongue. The tongues developed from the Roman include the modern Romance languages, which are chiefly the Italian, Rumanian, Spanish, Portuguese, and French. The literature and language of the Latins were preserved in remnants of the great libraries, which were carried by the clergy to the convents in the Middle Ages, and were afterward brought to the great libraries of Europe, particularly those of Rome. Many of the leading writers of Europe, following the revival of learning, wrote largely in Latin, and both the language and its literature were subjects of profound interest in all the higher institutions of learning for many centuries. All the modern languages of European people contain a large proportion of Latin words, the Latin addition to English being made at the time of the Norman conquest. Latin is characterized by a peculiar accuracy in expressing thought. This element, in connection with its supplying the roots of many derivative words, causes it to still hold its place of prominence as a study in the secondary and higher institutions.

LITERATURE. Roman literature was limited to a few writings for about five centuries after the founding of Rome. It may be said that the "Law of the Twelve Tables," prepared about 450 B. C. and hung up in the Forum, was the first prose composition of importance. The earliest writings were fashioned almost exclusively after Greek models and their lyric, heroic, and dramatic meters came from the Greeks. Rome had elementary schools as early as 450 B. C., where reading, arithmetic, writing, and music were taught. Many of the teachers were Greeks and the children of wealthy families were sent to Greece to complete their education, but excellent higher schools and colleges were later established in all the Roman cities. The first translation of Greek classics into Roman was made by a Grecian slave who came to Rome about 250 B. C. He also wrote and acted plays inspired by Greek writings. "The Origines" is a work written by Marcus Portius Cato in the 2d century. It consists principally of a history of the origin of Rome and several other cities of Italy. Ennius, a Roman of

the same period, introduced a new style of literature, somewhat resembling the Grecian. His writings are largely poetical history and his "Annals," a poetical history of Rome, was for two centuries the national poem. He was honored by having his bust placed in the tomb of Scipio. The writings of Plautus belong to the early part of the 2d century, and are noted for their vigorous and brilliant wit. Terence, a learned and graceful humorist, who flourished about the middle of the 2d century, turned attention to greater refinement and more cultured forms of expression.

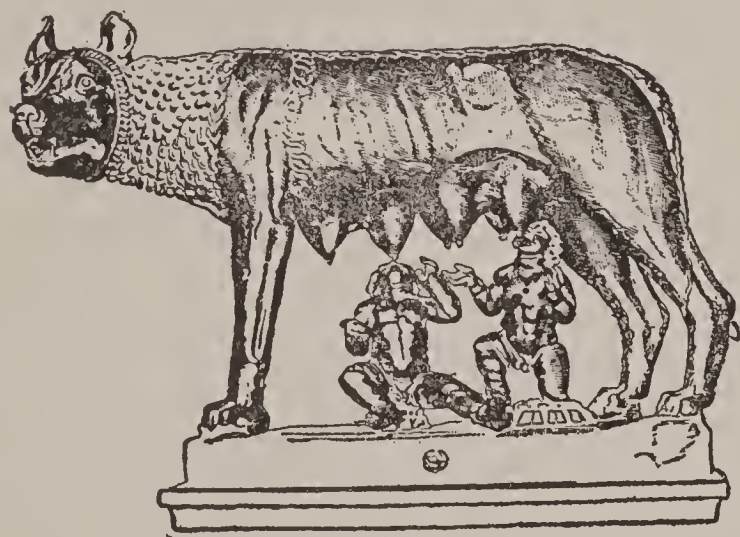
The Latin tragedies of the early Roman period were copied from the masterpieces of Sophocles and Euripides. Their comedies were translated from Aristophanes and other writers, their philosophy was borrowed from the Portico and the Academy, and their orators, even in the palmiest days, proposed to pattern after the speeches of Demosthenes and Lysias. To the 1st century B. C. belong the illustrious names of Varro, Cicero, Virgil, Horace, Livy, and Sallust. Varro founded large libraries and a museum of sculpture, cultivated the fine arts, and sought to awaken literary tastes among his countrymen. He wrote on history, theology, philosophy, and agriculture. Cicero is the most eloquent of all the Romans. He ranked high as an essayist, orator, and letter writer; his principal productions include his four orations on the "Conspiracy of Cataline." The Roman schools used his orations for lessons and many of his essays still are familiar Latin text-books. Virgil and Horace are known as poets of the Augustan age. Virgil's "Aeneid" is modeled after the Homeric poems and has been used as a textbook up to the present time, holding its place in the schoolroom. Livy wrote 42 volumes of Roman history, beginning with the fabulous landing of Aeneas, and closing with the death of Drusus in the year 8 B. C. Sallust is another historian of eminence, his most noted writings embracing the "Conspiracy of Cataline" and the "Jugurthine War."

The noted writers of the 1st century A. D. include Seneca, Juvenal, Tacitus, and the two Plinys. Seneca was a brilliant orator, poet, and Stoic philosopher. His writings are remarkable for their moral purity. They include "Ethical Essays," "Tragedies," and "Instructive Letters." Juvenal produced works remarkable for their satire and eloquence. Tacitus wrote in a grave and stately, though sometimes sarcastic, style. His writings include "History of Rome," "Life of Agricola," and a treatise on Germany. Pliny the Elder is the author of "Natural History," a work of 37 volumes, covering the whole range of scientific knowledge of his time. Pliny the Younger was a charming letter writer; his writings extant include the "Epistles" and the "Eulogium upon Trajan." Quintilian was the most eminent rhetorician and literary critic of Rome. He lectured for 25 years and afterward pub-

lished his discourses in a work entitled "Institutes." His writings belong to the early part of the 2d century. Other writers of Rome include Emperor Marcus Aurelius, Saint Jerome, and Aurelius Augustine. Marcus Aurelius is remembered as a stoical writer, Saint Jerome as the translator of the Bible into Latin, and Aurelius Augustine as the author of the prophetic book called "The City of God" and of "Confessions."

ROMNEY (rŭn'nĭ), **George**, painter, born at Dalton, England, Dec. 26, 1734; died Nov. 5, 1802. He worked as an apprentice to a painter at Kendal and afterward settled at London. In 1762 he was awarded a prize by the Society of British Artists, after which he rose prominently in favor as a portrait painter. Critics place him as an artist next to Reynolds and Gainsborough. His portraits include those of Lady Hamilton, Joan of Arc, Lady Warwick, Emma Hart, and Richard Cumberland. Among his other paintings are "The Parson's Daughter" and "Bacchante."

ROMULUS (rŏm'ŭ-lŭs), brother of Remus, the traditional founder and first King of Rome. He was the son of Mars and Rhea Silvia, daugh-



WOLF STATUE AT ROME.

ter of Numitor, the Latin King of Alba. When Amulius usurped the Alban throne, he commanded the babes to be thrown into the Tiber, but they were cast ashore at the foot of Mount Palatine and suckled by a she-wolf. A shepherd named Faustulus discovered them and with the assistance of his wife, Acca Laurentia, brought them up in his own home. After attaining manhood, they discovered their true rank and restored their grandfather, Numitor, to his throne. Afterward they resolved to found a city on the spot where their lives had been saved, but consulted the omens to see who should select the site. As the honor fell to Romulus, he was scorned by his brother Remus. Romulus then slew him and exclaimed, "So perish every one who may scorn the city." It was founded in 754 B. C., and called Rome after his own name, and he became its first king. He made his city the asylum of refugees. As there was a lack of women, young Romans seized maidens from the Sabines, which became known

as the "Rape of the Sabines," and involved the new city in a war. The contest soon after ended through the entreaties of the Sabine wives and the two peoples became united. The death of Romulus, in 716 B. C., is accounted for in legends by the assertion that he disappeared in a thunderstorm.

ROOF, the covering of a building, designed to protect its interior from the weather, especially rain. The most important part of it is the framework, which in large buildings is very carefully and substantially constructed. The roof may be covered with a large variety of materials, such as tin, sheet iron, tiles, shingles, or slate. As used in carpentry, the roof consists of the framework by which the covering is supported. The principal timbers are the *rafters*, which set upon the *plates*, and are usually supported by *purlins*, which have a horizontal position and support the main or common rafters. The width between the supports is called the *span*, which is quite large in buildings of considerable size. The points at which the rafters meet indicate the height, called the *rise*, which is the distance above the level of the supports, while the slope, or angle, is called the *pitch*. In primitive carpentering the roof is common or plain, while the more ornamental styles are curved and hipped. Rafters are usually covered with sheathing made of lumber one inch thick. The shingles or other outside coverings are nailed to the sheathing.

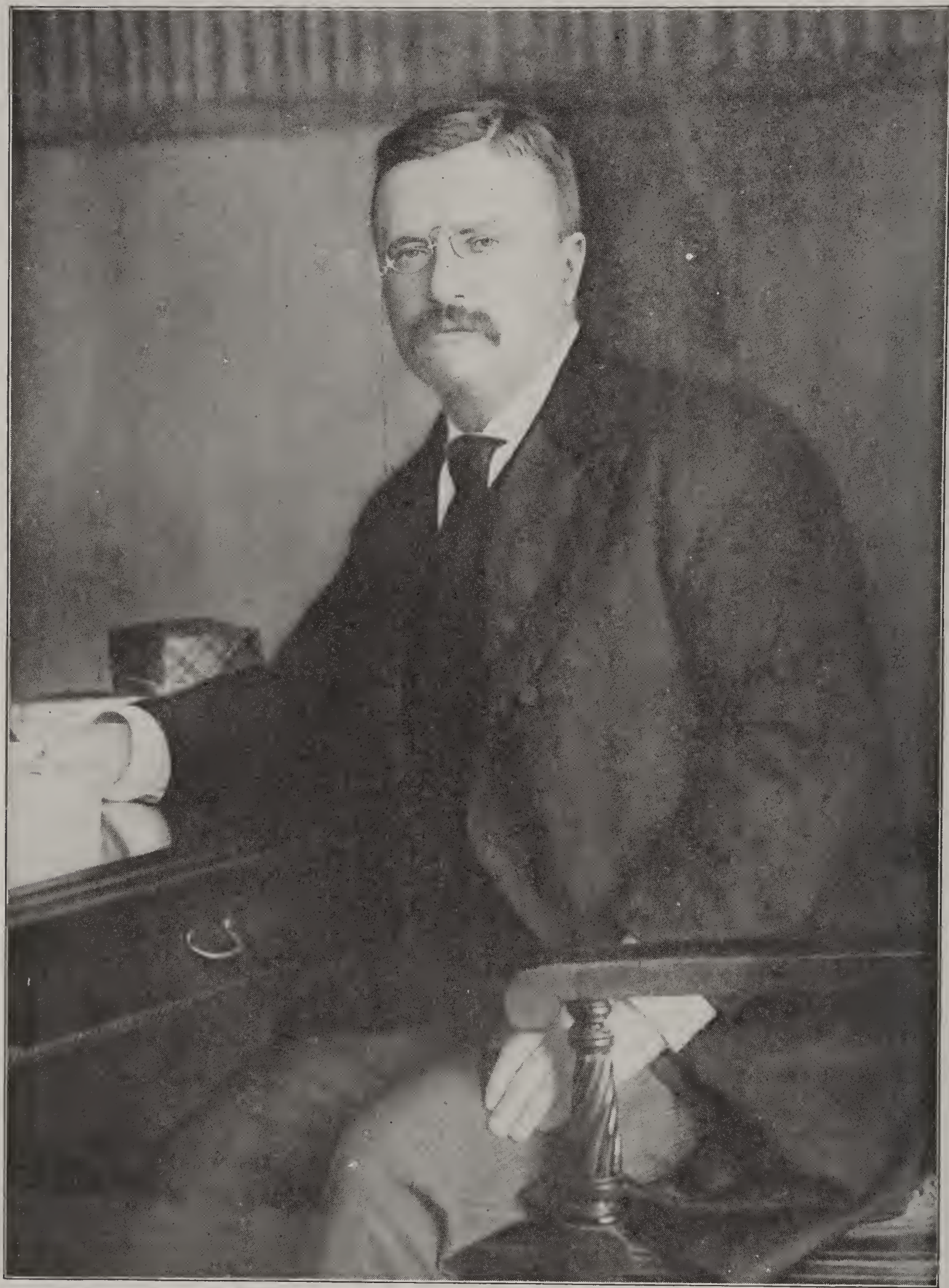
ROOK, a species of crow. It differs from other birds of the crow family in having a naked spot at the base of the bill and in feeding on grain and insects instead of carrion. It is about twenty inches long and the alar extent is forty inches. The color is black with a purple gloss. Rooks are sociable and gather in large flocks. They mostly inhabit cultivated and wooded districts, and prefer to nest near buildings. Rooks are native to Europe and are common birds in the vicinity of the Mediterranean.



ROOK.

They are permanent in milder sections, but in the colder regions move southward on the approach of winter.

ROON (rŏn), **Albrecht Theodor Emil von**, statesman and soldier, born at Pleushagen, Ger-



(Art. Roosevelt)

EX-PRESIDENT THEODORE ROOSEVELT.

many, April 30, 1803; died in Berlin, Feb. 23, 1879. He studied in the military academy at Berlin and entered the army in 1821, but served as a teacher of cadets from 1824 to 1827. His promotion to the different ranks was rapid, being made commander of a division in 1858, and the following year, minister of war. He commanded in the Schleswig-Holstein campaign of 1864 and in the Austro-Prussian War of 1866, receiving for his services the Black Eagle from King William. Soon after the close of the war he was detailed to reorganize the army of northern Germany, in which he held a command during the war with France in 1870-71, receiving at its close the rank of count. He became field marshal in 1873 and was made minister president of Prussia, but retired from public life in 1874. He is the author of a number of books on military geography.

ROOSEVELT (rō'zē-vēlt), **Theodore**, twenty-fifth President of the United States, born in New York City, Oct. 27, 1858; died Jan. 6,



THEODORE ROOSEVELT.

1919. He descended from a family of Hollanders noted for its philanthropy, public spirit, and high intelligence. Klaas Martensen van Roosevelt, from whom he is seventh in descent, emigrated from Holland to New Amsterdam (now New York) in 1649, and became a prosperous

burgher in the settlement. Several members of the family were prominent in State politics, and Robert B. Roosevelt, uncle of Theodore Roosevelt, served in Congress a term of years and was United States minister to the Netherlands. The latter is the son of Theodore Roosevelt, Sr., and Martha Bullock Roosevelt. He graduated from Harvard University in 1880 and spent some time traveling in Europe. In 1881 he was elected to the New York Legislature, serving in that body for four years. Though a delegate to the Republican convention in 1884, he joined the Independents in supporting Grover Cleveland for President. In the same year he removed to Medora, N. D., where he conducted a ranch until 1887. Returning to New York, he was appointed a member of the United States civil service commission in 1888, a position he filled with much ability until 1895, when he resigned to become president of the New York City board of police commissioners. This position he resigned in 1897 to become Assistant Secretary of the Navy.

At the outbreak of the Spanish-American War he entered the army as a volunteer and aided in organizing a regiment popularly known as the Rough Riders, of which he was a lieutenant

colonel. It consisted of volunteers from all trades and walks of life and rendered distinguished services in the Santiago campaign; particularly in the charge of San Juan Hill. In 1898 he was the Republican nominee for Governor of New York and in the November election defeated his Democratic opponent, Judge Van Wyck, with a majority of 18,079 votes. He was nominated for Vice President of the United States by the Republican national convention at Philadelphia in 1900, and after an active canvass in many of the states the ticket received a large majority of the popular and electoral votes.

At the death of President McKinley he succeeded to the Presidency, taking the oath of office in Buffalo, N. Y., at 3:36 o'clock on Saturday afternoon, Sept. 14, 1901. On Dec. 3 of that year he issued his first message to Congress, in which he outlined clearly his policy relative to the national government. In 1904 he was elected President over his opponent, Alton Brooks Parker, with a plurality of 2,524,244 votes, the largest in the history of the country. Among the events of his administration are antitrust legislation, the great anthracite coal strike of 1902, the treaty to complete the Panama Canal, the establishment of the Department of Commerce and Labor, and the conclusion of the Treaty of Portsmouth, N. H., which terminated the Russo-Japanese War. In 1909 he was succeeded by William Howard Taft and immediately went upon a hunting tour through the tropical region of Africa. He began his tour of the continent at Mombasa, British East Africa, and returned home by way of Europe. In 1912 he was the Progressive candidate for President, but was defeated, receiving 69 electoral votes.

Roosevelt became President at a younger age than any of his predecessors. His administration of the Presidency was characterized by an unusual vigor and enthusiasm. In 1916 he was a prominent factor in the Presidential campaign, although the Republican nomination was given to Charles Evans Hughes. He is the author of many books on historical, political, and general topics. They include "Hunting Trips of a Ranchman," "The Winning of the West," "Life of Gouverneur Morris," "History of New York City," "The Naval War of 1812," "Essays on Practical Politics," "The Rough Riders," "Life of Oliver Cromwell," "The Deer Family," "Life of Thomas H. Benton," "The Wilderness Hunter," and "The New Nationalism."

ROOT, in mathematics, such a number or quantity which, multiplied by itself one or more times, produces a given quantity; thus, 3 is a root of 9, since $3 \times 3 = 9$. If a given number is used twice as a factor, the product is called the *second*, or *square*, root of that number; if used three times, it is called the *third*, or *cube*, root; if used four times, the *fourth*, or *biquadrate*, root, etc. The term root is used in algebraic expressions to represent the value or values of the unknown quantity or quantities, which value

or values, substituted in the equation, will make the two members of it identical. To discover this value or these values is the object proposed in the solution of the equation.

ROOT, in botany, that organ which usually penetrates the earth, to imbibe from it nourishment suitable to the growth of the plant. In its development it divides itself into branches which are called *rootlets*, or *fibers*, and which terminate in smaller and hairlike ends of a spongy tissue. No true root produces buds or leaves, even if exposed to the air and light; if roots apparently do so, they are to be regarded as subterranean stems. The potato tuber is a familiar example of a swollen subterranean stem, though usually called a root; and some cacti and orchids have long, tough, aërial roots. Sometimes these are adventitious, as in the rootlets which issue from the lower joints of the Indian corn and from the joints of the grape vine.

Roots are either *annual*, *biennial*, or *perennial*, according as they perish in one or two years, or survive for several years, but even these conditions depend in a degree on climatic circumstances. Some that are normally perennial change to annual, as in the garden nasturtium, in which case a single season is sufficient to produce flowers and seeds, and others naturally annual are made biennial or perennial, by preventing the flowers from expanding and the fructification from taking place. Roots are liable to change in form and size, especially under cultivation, as in the cultivated carrot, whose normal root thickens and becomes fusiform, or in the turnip, where it swells laterally and becomes broad and flat, or in the dahlia, where the fibers increase to tubers. There is little proportion of the roots to the rest of the plant, and even this diminishes, until the root entirely disappears in whole genera of the lower orders.

The office of the root is not only to find nourishment, but to excrete various substances. It possesses the extraordinary power of penetrating bodies harder than the earth. The general tendency of the root to seek an opposite direction to the stem is admitted, but the exact reason cannot be assigned. Roots are frequently the stores of nutriment for the use of the next year's vegetation. They contain gums, resins, acids, and other properties found important in medicine and the arts.

ROOT, Elihu, statesman and diplomat, born in Clinton, N. Y., Feb. 15, 1845. He graduated at Hamilton College in 1864, where his father, Oren Root, was professor of mathematics for many years. In 1865 he taught in Rome Academy, studied law, and in 1867 began a successful practice in New York. He was appointed United States district attorney by President Arthur in 1883 and was chosen by President McKinley to be Secretary of War in 1899, as successor to Russell A. Alger. He remained in this position until 1904, when William H. Taft suc-

ceeded him. Besides rendering efficient service in establishing the government in Porto Rico and the Philippines, he served as a member of the Alaskan Boundary Tribunal, in 1903. He succeeded John Hay as Secretary of State in 1905, in which capacity he concluded many treaties with other countries. In the meantime he visited Canada, Mexico, and the leading countries of South America, making speeches to secure closer commercial relations. He was elected United States Senator in 1909, serving until 1915, and in 1917 served as commissioner to the new Republic of Russia.



ELIHU ROOT.

ROOT, George Frederick, musical composer, born in Sheffield, Mass., Aug. 30, 1820; died at Bailey's Island, Me., Aug. 6, 1895. He studied music in Boston and New York and taught in the latter city until 1850. In the same year he went to Paris, where he studied music a year, and after returning to America engaged in writing music. In 1859 he entered the firm of Root and Cody, in Chicago, which published his songs and pieces of music. Among his popular songs are "There's Music in the Air," "Hazel Dell," "Just Before the Battle, Mother," "Tramp, Tramp, Tramp, the Boys Are Marching," "Battle Cry of Freedom," and "Rosalie, the Prairie Flower." His larger works include "The Pilgrim Fathers," "The Haymakers," and "Belshazzar's Feast." The University of Chicago granted him a degree in 1872.

ROPE, the name of cordage formed of twisted fibers, such as fibers of flax, hemp, jute, cotton, or other vegetable species. The name is applied in an extended sense to cordage made of steel, iron, or other metallic wire. In the trade the distinction between a cord and a rope, other than of wire, is based on a collection of fibers one inch in circumference, though in popular usage smaller sizes are often termed ropes. Ropes made of vegetable fibers are composed of a number of rope yarns or rope threads. They are first twisted into strands, which in most cases are twisted together to form the finished product. The principal kinds are known as hawser-laid, cable-laid, and shroud-laid. In making a *hawser-laid rope* three strands are twisted left hand, the rope yarns being laid up right hand. A *cable-laid rope* is composed of three strands of hawser-laid rope twisted right hand. A *shroud-laid rope* is made of four strands, three strands being twisted round a

central strand. In cases where great strength is needed a series of hawser-laid ropes is formed into a *flat rope* by being placed side by side and fastened together by sewing.

The vegetable fibers used in rope making are derived largely from tropical countries. They include such fibers as the coir, secured from the husk of the cocoanut, the sisal hemp from South America and the manila or wild plantain produced largely in the Philippines. Formerly rope making was carried on mainly by hand, but now machines are used for making all kinds of cordage. Ropes are made with great care, because uniformity of strength is necessary, for, as in a chain, the strength of a rope depends upon its weakest place. Among the improvements of recent times is the manufacture of wire ropes, which are made from a number of wires twisted together. The strongest wire ropes are made of steel, but iron and other metals are used also, and to preserve them against rust a galvanic coating is applied. Ropes are used for various purposes in connection with mining, farming, manufacturing, and other productive enterprises. Metal ropes are used quite extensively in rigging ships, in elevators, and for many purposes in mining.

RORQUAL (rôr'kwâl), the largest genus of the whale family, found in the Arctic Ocean. It is distinguished from the Greenland, or right, whale by the presence of a dorsal fin, and by having nearly parallel longitudinal folds extending between the arches of the lower jaw, from the under lip along the chest and abdomen. The largest species is the *great northern rorqual*, found chiefly off the northern coast of Asia and Europe, and it is probably the most bulky and powerful of living animals. The body is longer and more slender than in the right whale, and the head is about one-fourth the length of the body. It attains a length of 90 to 110 feet. The food consists of crustaceans, medusae, and fishes. According to Desmoulins, a large quantity of pilchards and 600 good-sized cod have been found in the stomach of a single whale. The blubber is much thinner than in the right whale, hence it is comparatively of less value, and the yield rarely exceeds eight to ten barrels of oil. The longest baleen plates seldom measure four feet, hence it yields much less whalebone than the right whale. Two or three species have been described, all of which are active and restless, and they blow so violently as to be heard a great distance in calm weather. Fossil remains of small species of rorqual are found in regions that are now above the level of the sea.

ROSA (rô'zà), **Salvator**, painter, born near Naples, Italy, July 21, 1615; died March 15, 1673. He studied art in his native city and in 1633 went on a tour through the southern part of Italy and Sicily. Two years later he went to Rome, where he was patronized by officials high in the church and the state. Many of

his productions relate to the wild and romantic scenery associated with the banditti of Sicily. He left about ninety etchings and a large number of excellent portraits. Among his best known works are "Prometheus," "The Conspiracy of Cataline," and "Saul and the Witch of Endor."

ROSACEAE (rô-zâ'sê-ê), an important family of plants, including herbs, shrubs, and trees. This family embraces not less than 90 genera and 2,000 species, most of which are native to the North Temperate Zone. It includes a large number of beautiful and useful plants, many of which are cultivated very extensively for their fruit and for ornamentation. To this family belong the almond, apricot, apple, blackberry, cherry, peach, pear, plum, quince, raspberry, rose, and strawberry. The fruits are wholesome, except that of the cherry laurel, which is poisonous, and the kernels of the stone fruits have poisonous properties. These plants are distinguished by having regular flowers, seeds without albumen, and alternate leaves with stipules. Many of the species furnish articles of use in medicine, these properties being derived from the bark in some, from the roots in others, and from the flowers and fruits of still others. See **Rose**.

ROSAMOND (rôz'à-mônd), mistress of Henry II. of England, born about 1140; died in 1177. She was the daughter of Lord Clifford and lived at Woodstock. Her brothers, desirous of advancing their own fortunes, first brought her to the notice of the king, who frequently visited her. When Queen Eleanor discovered the friendship between her and the king, she became jealous, but Rosamond died soon after, presumably from the effect of a poisoned dagger. William Longsword, Earl of Salisbury, was the son of Rosamond and Henry II. She was buried in the Church of Goodstone, or Godstow, but Hugh of Lincoln caused the remains to be removed in 1191.

ROSARIO (rô-sä'rê-ô), a city of Argentina, on the Paraná River, 170 miles northwest of Buenos Ayres. It is the capital of the Province of Santa Fe and the second city of Argentina. The climate is temperate and healthful. It is finely located, has convenient railroad facilities, and is the center of a large interior and river trade. Among the manufactures are soap, flour, lumber products, furniture, utensils, leather, and machinery. The streets are regularly platted, intersecting each other at right angles. They are well paved and lighted with gas and electricity. The city has a fine cathedral, numerous other churches, and a number of schools, hospitals, academies, and institutions of higher learning. Population, 1916, 234,860.

ROSARY (rô'zà-rÿ), the name of a popular form of prayer in the Roman Catholic Church, applied generally to the bunch or string of beads used in counting such prayers. The beads are of various sizes and material, usually made

of stone, wood, or ivory. A complete Dominican rosary contains 150 small beads, separated into groups of ten or fifteen large beads, the small ones being used for the aves and the large ones for the paternosters. An ordinary rosary consists of fifty small beads, which are divided into groups by five large beads, hence a full rosary is formed by repeating three times. Every tenth ave is used in saying the doxology. The Pope, bishop, or some other dignitary or priest blesses the rosary before it is used. The rosary in its present form was introduced by Saint Dominic, the founder of the Dominicans, in the first half of the 13th century. Both Buddhists and Mohammedans use a string of beads for counting their prayers. The string of the Mohammedans has 99 beads, which they drop while pronouncing the 99 names of God occurring in the Koran.

ROSCIUS, Quintus, Roman comedian, born at Solonium, near Lanuvium, about the year 105; died in 62 B. C. He had the advantage of the friendship of many Romans belonging to the nobility. Sulla gave him a gold ring. Cicero spoke of him in terms of the highest praise and affection. It is said that Roscius and Cicero practiced the art of expressing thought in the most elegant form, the former by his gestures and the latter by his words.

ROSE, the common name of plants of the genus *Rosa* and its natural order *Rosaceae* (q. v.). They have prickly stems and un-

Among the common species are the *tea*, *damask*, *sweet brier*, *yellow*, *musk*, *Provence*, *moss*, *ever-green*, and *monthly*. The *American Beauty* is an elegant species originated in the United States, and is cultivated for its fragrant and beautiful, large flowers. Some species, as the *common climbing rose*, may be trained to ascend arches, arbors, and trellises. Poets have made the rose famous, oratory has been enriched with its virtues, and it has long been the emblem of reserve and faithfulness. It is the most beautiful and fragrant of flowers. Many millions of roses are sold annually in the market, being among the most popular of the cut flowers. Attar (q. v.), or otto of roses, is the most important product, but roses also possess medicinal properties. See **Perfumes**.

ROSE ACACIA, an ornamental shrub of North America, found in the mountains of Mexico and the United States. It is a species of locust, has very large inodorous flowers, and bears pods that are covered with coarse hair. The plant is native to the southern part of the Allegheny Mountains, but is now cultivated as an ornamental shrub.

ROSEBERRY (rōz'bēr-ī), **Archibald Philip Primrose, Earl of**, statesman, born in London, England, May 7, 1847. He graduated from Oxford University, and in 1868 succeeded his grandfather as fifth earl. In 1872 he was made a commissioner to Scotland, became rector of the University of Edinburgh in 1880, and served as undersecretary of State from 1881 to 1883. He was Secretary of Foreign Affairs in the Gladstone administration in the beginning of 1886, but held the position only six months, until the fall of Gladstone's government. Rosebery took a position strictly in accord with the Home Rule policy and effectually defended it in a number of able speeches. In 1889 he was elected for the city division of the London county council and in 1892 succeeded Gladstone as Premier, a position he held until the Liberals went out of power, in 1895. He was made lord rector of the University of Glasgow in 1899. His books include "Sir Robert Peel," "The Last Phase," and "The Questions of Empire."

ROSECRANS (rō'zē-krānz),

William Starke, distinguished soldier, born in Kingston, Ohio, Sept. 6, 1819; died near Redondo, Cal., March 11, 1898. He graduated from the West Point Military Academy in 1842 as a classmate of John Pope and James Longstreet, and served as professor of engineering and natural philosophy at West Point from 1844 to 1847. He resigned this position in the latter year and retired to private life as an architect and civil engineer, but volunteered at the be-



TEA ROSE.



MOSS ROSE.

equally pinnate leaves. About fifty species in a wild state have been described, most of which are confined to the North Temperate Zone, but by cultivation about 1,000 species have been secured. These include both simple and double flowers and a large variety of colors. Some of the species differ so materially from those in a native state that they are difficult to classify. The rose is easily cultivated, requiring sunshine, rich soil, and plenty of moisture.



(Opp. 2450)

AMERICAN BEAUTY ROSE.
Notice both the Bud and the Flower.

ginning of the Civil War, in 1861, and was commissioned brigadier general in the regular army. In 1862 he became major general of volunteers and commanded a division of the army of the Mississippi, taking part in the battles of Iuka and Corinth. Soon after he was made commander of the army of the Cumberland, taking part in the Battle of Stone River, Tennessee, and at Chickamauga and Chattanooga, being defeated in the two last named engagements by General Bragg with a loss of 16,000 men. He was soon after succeeded by General Thomas, pending the arrival of General Grant, and in 1864 became commander of the department of the Missouri, expelling General Price from that State.

In 1867 Rosecrans resigned his position in the army and was mustered out with the rank of brevet major general. President Johnson appointed him minister to Mexico in 1868, but the following year he engaged in railroad construction and settled in California. He served in Congress as a Democrat from 1881 to 1885 and was register of the United States treasury the next eight years. Rosecrans was regarded a good strategist and military leader, his removal from command being due largely to unavoidable circumstances. Congress, in 1889, restored him to full rank and pay as brigadier general and placed him on the retired list.

ROSEMARY (rōz'mā-rŷ), an evergreen shrub of the mint family, which is native to Southern Europe and Western Asia. It is from three to eight feet high, has narrow, opposite leaves, and bears pale blue flowers. All parts of the plant have an aromatic flavor. The leaves have a pungent taste and yield an essential oil, called *oil of rosemary*, which is used as an aromatic perfume and in cookery. It possesses medicinal properties of use in headache and mental weariness, and is an essential ingredient in a perfume called Hungary water. Spain is noted for the prolific growth of the rosemary, which furnishes good bee pasture and may be smelled many leagues off the coast.

ROSENKRANZ (rō'zēn-krānts), **Johann Karl Friedrich**, educator and author, born in Magdeburg, Germany, April 23, 1805; died June 17, 1879. In 1828 he completed the course of study at the University of Halle, where he graduated with honors, and in 1833 succeeded Kant as professor of philosophy at Königsberg. He belongs to the Hegelian school of teachers and is the author of many books which have been extensively translated and read by school-teachers and others as authoritative works on pedagogical and historical subjects. His writings include "History of Culture," "History of German Poetry in the Middle Ages," "Subjective Psychology," "Hegel as the National Philosopher of Germany," "History of Literature," "Esthetics of the Ugly," and "Goethe and His Works."

ROSES, Wars of the, the contest between

the houses of Lancaster and York for supremacy in England. It constituted a disastrous warfare, with short intervals of peace, for thirty years, from 1455 to 1485. The former chose the red rose as an emblem and the latter chose the white, hence the name. The house of Lancaster had been in possession of the throne for three generations, attaining to the crown in 1399 and being represented successively by Henry IV., Henry V., and Henry VI. The latter began to exhibit weakness of mind in 1454 and Parliament accordingly appointed Richard, Duke of York, protector of the realm during his illness. Richard had already advanced claims to the throne and, on the recovery of Henry, he declined to give up his power and vigorously organized to maintain it by force of arms. In 1455 the Battle of Saint Albans was fought between the contending parties, in which the king's army was defeated and he became a prisoner.

The queen of Henry, Margaret of Anjou, immediately organized a force in the north of England and won the Battle of Wakefield, in which the Duke of York was defeated and slain. Soon after Edward, son of the Duke of York, raised an army and eventually defeated the forces of the queen, becoming Edward IV. in 1461. He was compelled to leave England shortly after by the army raised under the direction of Queen Margaret and the Earl of Warwick, when Henry VI. was restored, but Edward returned in 1471 and defeated Warwick at Barnet and the queen at Tewkesbury, both being among the slain. Edward was succeeded by his son, Edward V., who, with his brother Arthur, was murdered in the Tower and Richard III. became king. His reign ended with the Battle of Bosworth in 1485, in which he was defeated and slain by the Earl of Richmond, who succeeded him as Henry VII.

ROSETTA STONE (rō-zēt'tā), the name of a stone found near the city of Rosetta, Egypt, by a French engineer in 1798. It consists of black basalt and bears an inscription of the year 196 B. C. in honor of Ptolemy Epiphanes. The inscription forms a key to the reading of the hieroglyphic characters. It is in the British Museum. The city of Rosetta is near the mouth of the Nile, thirty miles west of Alexandria. Population, 1917, 18,648.

ROSEWOOD, the name given to various hard, close-grained woods derived from different species of trees, so called from their roselike scent when newly cut. Most wood of this class is dark-colored with several shades and stripes, and is used extensively in the manufacture of furniture and cabinet products. It is heavy and expensive, and is employed principally as veneers and for ornamental purposes. The finest quality is produced in Brazil and other South American countries, but there are also productions of it in the West and East Indies.

ROSICRUCIANS (rōz-ī-kru'shānz), the name of a secret society organized in Württemberg, Germany, in the 17th century, whose aim was to vitalize and prolong human life. The moving spirit in this society was Johann Valentin Andreae, a Lutheran divine, who founded it upon reports published by a certain Christian Rosenkreutz in relation to discoveries made in Egypt. The latter spent a large portion of his life among the Brahmans, in the pyramids of Egypt, and in Western Asia, gathering while abroad much information in regard to the modes of life in the East. Some writers have connected the society with the Freemasons and other fraternities and it is generally termed the Honorable Order of the Rosa Cross. The leaders extended their organization to many countries of Europe, but they are now looked upon as impostors who laid claim to supernatural powers.

ROSIN (rōz'in), a substance obtained by distilling a mixture of water and turpentine. Crude turpentine from cone-bearing trees, such as the pine, yields from 65 to 90 per cent. of rosin. It is translucent when entirely freed from water and the odor is similar to that of turpentine. Large quantities are manufactured in British Columbia and some parts of the United States, especially in North Carolina and Florida. It is used mainly in making soap, sealing wax, varnishes, basilicon ointment, and adhesive plasters and cements. See **Resins**.

ROSS, Alexander Milton, naturalist, born in Bellville, Ontario, Dec. 13, 1832; died Oct. 27, 1897. He studied and practiced medicine in New York City and served as a surgeon in the Federal army of the United States during the Civil War. Soon after the close of the war he returned to Canada, where he collected and classified the flora and fauna of that country. His collections of plants and animals contain about ten thousand species. In 1881 he aided in founding the Society for the Diffusion of Physiological Knowledge. Several governments decorated him with awards and medals. He published "Birds of Canada," "Recollections of an Abolitionist," "Flora of Canada," "Vaccination a Medical Delusion," and "Mammals, Reptiles, and Fresh-Water Fishes of Canada."

ROSS, Sir James Clark, explorer, born in London, England, Feb. 15, 1800; died April 3, 1862. He was a nephew of Sir John Ross, entered the navy in his twelfth year, and accompanied his uncle on two voyages to the Arctic Ocean. In 1831 he discovered the north magnetic pole and was made post captain. He commanded an expedition to Baffin Bay in 1836 and three years later made a voyage to the Antarctic seas, approaching within 160 miles of the south magnetic pole. Ross discovered the volcano Mount Erebus in 1841, having sailed southward from New Zealand with the *Erebus* and the *Terror*, and gave the region the name of Victoria Land. In 1843 he returned to Eng-

land, where he was knighted, and in 1848 made an unsuccessful search for Sir John Franklin in Baffin Bay. He published "Voyage of Discovery in Southern Seas."

ROSS, Sir John, Arctic explorer, born at Inch, in Wigtonshire, Scotland, June 24, 1777; died Aug. 30, 1856. He was the son of a minister and entered the navy when but ten years old, serving fifteen years as midshipman. In 1818 he became captain and accompanied Parry on an expedition to the Arctic regions, the aim being to explore Baffin Bay and find a northwest passage. He commanded an expedition to the same region in 1829, when he discovered the peninsula of Boothia Felix, and on his return to England was knighted. He became consul at Stockholm in 1838 and was made rear admiral in 1851. Among his writings are "Treatise on Navigation by Steam," "Residence Region," and "Letters to Young Sea Officers."

ROSSETTI (rōs-sēt'tē), Christina Georgina, poetess, born in London, England, Dec. 5, 1830; died Dec. 30, 1894. She was educated under private tutors and at an early age gave evidence of much ability in producing poetical writings. In her early work she was aided by her brother, Dante Gabriel Rossetti, but her glowing imagination and spiritual insight soon made her independent. Her writings are in a sense serious and reflective, but give evidence of genius and mystic qualities. Critics accord her a place next to Mrs. Browning among the women writers of England in the 19th century. Her chief works include "Called to be Saints," "The Face of the Deep," "Speaking Likeness," "Up Hill," "The Princess's Progress and Other Poems," and "Maude: Prose and Verse."

ROSSETTI, Dante Gabriel, painter and poet, born in London, England, May 12, 1828; died April 10, 1882. He was the eldest son of Gabriele Rossetti, studied at King's College, and in 1848 joined Hunt, Millais, and others in establishing the brotherhood of Pre-Raphaelites. He exhibited his beautiful "Girlhood of the Virgin" in the free exhibition in 1849. Soon after he began to produce many works of merit, a number being exhibited the year after his death at the Royal Academy. His principal paintings include "Dante's Dream," "Venus Verticordia," and "Salutation of Beatrice." His poetical writings are better known and appreciated than his paintings, some having been widely translated. The principal poetic works include "Hand and Soul," "The House of Life," "Dante at Verona," and "King's Tragedy and Other Ballads." His brother, William Mitchel Rossetti, born in London, Sept. 25, 1829, is noted as a poetical writer. After studying at King's College, he entered the English civil service and joined his brother and others in the promotion of Pre-Raphaelitism. His principal writings include "Collected Works of Dante Gabriel Rossetti," "Lives of Famous Poets," and "Wives of Poets." He edited

"Selections from the Poems of Walt Whitman" and lectured on art.

ROSSETTI, Gabriele, eminent author, born in Vasto, Italy, Feb. 28, 1783; died in London, April 26, 1854. He studied in the University of Naples, but the unusual political excitement then prevailing caused him to flee as a refugee to England in 1824. There he devoted himself to a studious literary career and published a number of works of merit. He was professor of Italian literature in King's College, London, and an influential lecturer for many years. His principal works include "Commentary on Dante," "Beatrice and Dante," and "Poetry of Gabriele Rossetti."

ROSSINI (rōs-sē'nē), **Gioachino Antonio**, dramatic composer, born in Pesaro, Italy, Feb. 29, 1792; died Nov. 13, 1868. He was the son of a strolling player and entered the Lyceum of Bologna in 1807, where he studied with great industry. It may be said that he was largely self-taught, since he gave all his leisure time to the study of Italian and German masters. His first musical production, "Tancredi," was played at Venice in 1813 and possesses such merit that he at once rose to fame and honor as a composer. He visited Berlin, Vienna, and London in 1824, and in the same year settled at Paris, where he became connected with the Italian theater the following year, holding a high-salaried position until 1830. Later he resided at Bologna and Florence, but returned to Paris in 1855, where his death occurred. His body was removed to Florence in 1887. Rossini attained great popularity and wealth. His principal productions include "William Tell," "Barber of Seville," "Semiramide," "Othello," and "Stabat Mater."

ROSSITER (rōs'sī-tēr), **Thomas Prichard**, painter, born in New Haven, Conn., Sept. 29, 1817; died May 17, 1871. He studied art in a studio of his native city, where he afterward established an art gallery, and in 1840 went abroad. After studying and practicing his art in Rome, Paris, and other European cities for six years, he returned to open a studio in New York. From 1853 to 1856 he was abroad, chiefly as a means to promote art work, and in the latter year won a gold medal at the Paris exposition. He returned to the United States in 1856 and soon after settled permanently in Cold Harbor, N. Y., where he died. His best known paintings include "Venice in the 15th Century," "Return of the Dove to the Ark," "Home of Washington," and "The Wise and Foolish Virgins."

ROSSLAND (rōs'land), a city of British Columbia, six miles north of the international boundary, on the Canadian Pacific and other railroads. It is located in the western part of the Kootenay mining district and is surrounded by a region that produces large quantities of gold, silver, and copper. The noteworthy buildings include the high school, the Allen Hotel,

the city hall, and several fine churches. It has flour mills, bottling works, engineering works, and an electric power and light plant. Twelve miles distant by rail, at Trail, are large smelters. Rossland has a large trade in merchandise and manufactures. Population, 1916, 6,859.

ROSTOCK (rōs'tōk), a city of Germany, in Mecklenburg-Schwerin, on the Warnow River, sixty miles northeast of Lübeck. It is six miles from the Baltic Sea, has a good harbor, and is connected with interior Germany by important railroads. Rostock has an active trade in cereals, live stock, fish, timber, salt, and merchandise. The principal manufactures include leather, cotton and woolen goods, chemicals, machinery, pottery, lime, toys, and clothing. The University of Rostock was founded in 1419. Rostock is the birthplace of Blücher and contains a colossal monument to that eminent military leader. Population, 1920, 65,377.

ROSWELL, county seat of Chaves County, N. M., about 160 miles southeast of Santa Fé, on the Santa Fé Railroad. The industries include cereal mills, stockyards, and machine shops. Among the chief buildings are the courthouse, high school, public library, city hall, and federal building. It has a large shipping trade in farm produce. Population, 1920, 7,062.

ROT, the name of a class of diseases that affect many plants. They are due to the attacks of fungi or other low vegetable organisms. These diseases are variously named, depending upon their nature and the plants they affect. *Root rot* is a disease of many cultivated plants and frequently proves injurious to the grape and forest trees. It is due to the growth of some of the larger fungi, which attack the roots and cause them to decay. *Black rot* is peculiar to grapes and causes the leaves and fruit to turn black in spots and finally die. *Bitter rot* causes brownish or blackish spots in apples, while *tomato rot* causes the fruit to decay when nearly ripe. The tissues of wood are destroyed by *dry rot*, which is due to the fungi attacking the timber kept in damp places, such as the supports in cellars, mines, and foundations of buildings.

ROTATION OF CROPS (rō-tā'shūn), the name applied to the practice of changing from year to year the crops cultivated in a given field. It is practiced chiefly to maintain or increase the fertility of the soil, from the fact that plants differ in their habit of growth and in the proportion of elements necessary for their maturity. For instance, the productiveness of a field decreases from year to year if wheat is grown continuously, but if the crops are rotated, that is, if wheat, oats, corn, and clover are alternated, the productiveness is maintained to a considerable extent or even improved. Rotation of crops differs materially in different sections, owing to the crop suited to the soil and climate. Corn, potatoes, cotton, or any crops that can be cultivated act to free the ground

from weeds, while deep-rooted plants, such as clover and alfalfa, draw their nutrition largely from great depths, hence tend to mellow the soil and leave the surface enriched. Insects and diseases that affect one crop do not destroy another. For instance, chinch bugs and rust injure barley and wheat, but do not affect corn cultivated on the same ground the following year. Agriculturists aim to grow crops that can be consumed upon the farm rather than those that are sold, and in this way enrich the soil by associating the cattle industry with the cultivation of the soil.

ROTHSCHILD (röths'child), the name of an eminent family of bankers, so named from *Zum Rothen Schilde*, meaning To the Red Shield, the sign of the house in which their ancestors lived in Frankfort, Germany. Mayer Anselm, the founder of this great financial house, was born in Frankfort-on-the-Main in 1743 and died in 1812. He was a German of Jewish extraction and was the first to assume the name of Rothschild. After receiving an education for the position of a rabbi, he won the confidence of the landgrave of Hesse, who intrusted him with the care of \$5,000,000 during the French invasion of 1806. He was allowed the free use of this vast sum and, by putting it out at interest, not only prevented the French from securing it, but was enabled to lay the foundation for the great wealth now possessed by his posterity. Afterward he associated his sons with him in the banking business, and the family has since been connected closely with the financial affairs of Europe. His five sons were the financial kings of Europe at the time of his death, and they and their descendants have continued to gain in wealth and influence ever since. Anselm Mayer von Rothschild (1773-1855) became the head of the Frankfort bank. The others were established at different financial centers as follows: Solomon Mayer (1774-1855), at Vienna; Nathan Mayer (1777-1836), at London; Karl Mayer (1788-1855), at Naples; and Jacob Mayer (1792-1868), at Paris.

Frankfort is the common center of the Rothschild system of banks, and no business of magnitude is transacted without communicating with headquarters. The business consists mainly of making loans on a large scale, such as those negotiated by governments, railroad companies, and corporations looking forward to the building of canals and other great enterprises. However, the company also does a general banking business. A splendid example of their ingenuity is seen in their employment of swift-sailing boats, carrier pigeons, and telegraphic communications for the purpose of ascertaining the fortunes of battles in the time of great conflicts, thus enabling them to turn their speculative enterprises to good account. An enterprise of this kind conducted by Nathan Mayer in connection with the Battle of Waterloo gave the banking house information of the great contest several hours

before it reached England, and from this fact the institution gained about \$1,000,000. Austria created the five brothers barons in 1822, and several members of the family have been similarly honored in Germany and England. Lionel Nathan (1808-1879) was the first Jew to enter Parliament (1858) and his son, Baron Nathaniel von Rothschild (1840-1915), was made a peer in England in 1885. A large number of hospitals and educational institutions have been endowed by different members of the family.

ROTTERDAM (röt'tēr-dām), a city and river port of the Netherlands, the second city of the kingdom, 45 miles southwest of Amsterdam. It is situated on both sides of the Maas River, fifteen miles from the North Sea, and is intersected by a splendid system of canals, thus giving it advantages of vast importance. It has extensive electric railway and railroad facilities. The trade is the most important in the Netherlands, aggregating annually a vessel tonnage of 13,750,000 tons, a figure excelled by only a few cities of the world. The export trade is principally in manufactured goods, provisions, mineral waters, and spirits, while the imports consist of cotton, coffee, spices, sugar, and dye-woods. Among the manufactures are beet sugar, ironware, jewelry, cotton and woolen goods, soap, vinegar, liquors, sailcloth, windmills, and machinery. The city is supplied with electric and gas lights, stone and asphalt pavements, sewerage, waterworks, and rapid transit.

Rotterdam is well built and is divided into two parts by the main thoroughfare, known as Hoog Straat. It has fine gardens and parks, numerous charitable and educational institutions, and many fine monuments. The Saint Laurence Church is a Gothic structure of the 15th century and the Museum Boyman's is a celebrated building, but was partially destroyed by fire in 1863. Other features include the commercial exchange, the courthouse, the town-hall, the post office, the central railroad station, and the public library of 145,000 volumes. In the Great Market is a bronze statue of Erasmus. Other statues are dedicated to Tollens, De Witt, and the engineer Stieltjes. The docks and quays are extensive and the river and canals are crossed by numerous bridges. Rotterdam was founded in 1416. Population, 1915, 480,240.

ROUBAIX (rōo-bă'), a city of France, in the department of Le Nord, six miles northeast of Lille. It is a modern city, coming into importance in the last century. The Roubaix or La Marca canal furnishes connections with the Scheldt River in Belgium. It has modern municipal facilities, extensive railroad connections, and an important trade. The manufactures include cotton textiles, woolen and silk goods, beet sugar, carpets, leather, and machinery. Roubaix is the seat of the celebrated École Nationale des Arts Industriels. Population, 1906, 121,017; in 1921, 122,723.

ROUEN (rōo-än'), a city of France, for-

merly the capital of Normandy, on the Seine River, 86 miles northwest of Paris. It is a beautiful and modern-appearing city, has extensive railroad and navigation facilities, and is the center of a large domestic and foreign trade. The river has been improved so sailing vessels of the largest kind can reach the city, principally by dredging, and it has a spacious and well-improved harbor. It is provided with modern municipal facilities, such as telephones and electric street railways, and has sanitary sewerage, municipal waterworks, and public baths. The public library contains 145,000 volumes. Other features include the Church of Saint Ouen, the cathedral erected by Philip Augustus, the Palais de Justice, the Hotel de Ville, and the central railroad station. Among the manufactures are silk textiles, cotton and woolen goods, cordage, chemicals, hats, paper, hardware, lace, ribbons, sailing vessels, and machinery. The Northmen took possession of Rouen in 843, and in 1066 it served as the residence of the Duke of Normandy, who in that year conquered England and established his court in London. Joan of Arc was burned here in 1431 and the spot is now commemorated by a beautiful statue dedicated to her. German troops occupied Rouen in the War of 1870-71. Population, 1906, 118,459; in 1921, 124,987.

ROUGE (rōōzh), the name of a cosmetic prepared from safflower and used to improve the complexion. In the market it is known as vegetable rouge. This product is obtained from drying the leaves and then pulverizing and digesting them in a weak solution of carbonate of soda. Into this is placed some finely carded cotton, and the alkaline mixture is neutralized with lemon juice or vinegar. A solution of soda is used to wash the color out of the cotton, when it is again precipitated with vinegar, or citric acid. To the solution is added a quantity of finely powdered chalk, which becomes colored and gives body to the preparation. Jewelers use a preparation known as rouge to polish their wares. This product is obtained by calcining sulphate of iron in a high temperature, after which it is washed with water until it ceases to affect litmus paper.

ROUGE-ET-NOIR (rōōzh-ā-nwār'), the name of a game played with cards. It is so called because it is played upon a table marked with two spots of red and black, the name meaning *red and black*. The game is played principally at the fashionable watering places of Europe and is a favorite among those who practice gambling.

ROUGHRIDERS (rūf'rīd-ērz), the name of a regiment of volunteer cavalry organized by Theodore Roosevelt and Leonard Wood for service in the Spanish-American War. The former was first assistant secretary of the United States navy at the beginning of the war and induced many cowboys from the states lying west of the Mississippi to join the organization. This regi-

ment took an active part in the battles of El Caney and San Juan. In 1899, a patriotic society of Roughriders was organized, to which the members of the regiment and their descendants are eligible.

ROULETTE (rōō-lēt'), a game of chance played with a small ivory ball on a table. A revolving disc is located in the center of the table, the sides of which are divided into 38 compartments painted half red and half black. The compartments are numbered from one to thirty-six, besides a zero and a double zero. Players place their wager upon one of the compartments, and, if the ball falls into the compartment of their choice, they receive thirty-six times their stake. A player may bet on two or more numbers, depending upon the rules of the game. Roulette is usually associated with public gambling.

ROUNDERS (round'ērz), a game of ball played extensively in England as an outdoor exercise. Each side has nine players, who alternate as the *in* and the *out* sides. The ground is platted into a square, which has three goals and a batter's station. It is the aim of the batter to drive the ball as far into the field as possible and run completely round the goals, or make as many goals as possible. The batter has three strikes, but must run the third time whether he hits the ball or not, and is declared out if the ball is caught in the air by one of the fielders, or he is touched by the ball before he reaches a goal. When three men are out, the side playing must take the field, while those in the field take the bat. This game is the origin of the more highly developed American game of baseball.

ROUNDHEADS, the name given as a mark of derision to the Puritans, or supporters of Parliament, during the Civil War in England, from their fashion of wearing the hair short. The Cavaliers, or adherents of Charles I., wore their hair in long ringlets.

ROUND TABLE, the name given to the fraternity of knights which were associated with Arthur, King of the ancient Britons. They were so called from the round table at which they took their seats in his palace. See **Arthur**.

ROUSSEAU (rōō-sō'), **Jean Baptiste**, eminent lyric poet, born in Paris, France, April 10, 1670; died in Brussels, Belgium, March 17, 1741. He was the son of a shoemaker and, after attending several educational institutions in Paris, began to write lyric poetry for the theater. Later he wrote a large number of songs and epigrams, many of which have passed down to the present time and still hold their popularity. Rousseau was banished from France in 1712 for making a charge against a contemporary writer, having previously been convicted of libel. Subsequently he lived in Switzerland most of the time, but afterward settled at Brussels, where he formed the acquaintance of

Voltaire. His complete works were collected and published in 1820.

ROUSSEAU, Jean Jacques, distinguished French author, born in Geneva, Switzerland, June 28, 1712; died in Paris, France, July 2, 1778. He descended from a French family that had settled in Geneva a century before his birth as Protestant refugees. His father, Isaac Rousseau, was a watchmaker and his mother died shortly after his birth. He was tenderly cared for in infancy by a sister of his father, and at the age of ten years was placed under the care of a Protestant minister at Boissy, where he remained two years, and in 1725 became apprenticed to an engraver in Geneva.

As a youth Rousseau was studious, but he soon formed undesirable habits for want of a fixed home, especially while under the care of the Geneva engraver, a violent and harsh man. In 1728 the impulsive youth fled from the real or fancied severity of his principal and found a home with Madame de Warens, who resided at Annecy. She sent him to a charity school in Turin. While at this institution he embraced Catholicism, and afterward again made his home with Madame de Warens. He went to Paris in 1741 to seek his fortune, where he earned his livelihood as a clerk and in copying music, but in 1743 was made secretary to the French ambassador at Venice. Two years later he resigned and returned to Paris to engage as a musical copyist and to become a student of sciences. After forming the acquaintance of Grimm, Vasseur, Diderot, and D'Holbach, he began to write for Diderot's "Encyclopédie."

In 1750 the attention of Rousseau was attracted to a prize offered by the Academy of Dijon for the best essay on the question "Has civilization tended to improve the morals?" and wrote the essay that secured the prize. In it he took the position that civilization has not only failed to purify manners, but has been the cause of much misery and crime afflicting mankind. His next writing consisted of an operetta, in 1752, to which he wrote the music. Soon after he issued a publication called "Letters on French Music." He returned to Geneva in 1754 and again embraced Protestantism, but went back to Paris soon after to devote the remainder of his life almost exclusively to literary work. His writings are principally of a political character and exercised a remarkable influence in forming public opinion to hasten the French Revolution. Among the views expressed by him are the belief that monarchy is a form of tyranny, that all men are born equal, that the possession of vast property is a crime to society, that the soil is the common heritage of all, and that religion is largely superstitious and traditional. France being in a state of revolution and change, Rousseau was compelled to flee to Neuchâtel and other places for safety, and in 1766 he proceeded to England, where he formed the friendship of Boswell and Hume. In 1767 he returned

to France and supported himself by writing and copying music, but lived in great poverty until his death.

Three works of Rousseau are noted particularly for their widespread effect upon public opinion and the trend of public thought, though to us they appear rather sentimental, a fact to be attributed to the particular characteristics of his age. The first of these is "Julia," or "The New Héloïse," a romance that appeared in 1760. It awakened an enthusiasm for a return to nature in the recognition of rights and training of children. His remarkable work, entitled "The Social Contract," is the second of these, which supplied the governmental theories of the French Revolution and had a marked influence on the public thought of America. It announced that laws are not binding unless they are agreed to by all the people, suggested the word *citizen*, and supplied the cry of "Liberty, Equality, and Fraternity" for the French Revolution. "Emile," or "On Education," is his third great work, in which he dealt with educational ideas that fell upon fruitful ground and commended themselves to the study of such eminent teachers as Pestalozzi and Froebel. Many of the details of his plan of education appear fanciful, but this work was the means of turning the hearts of the parents to the children, and awakened in them a vivid idea of the importance and value of family life and parental care. He deprecated the practice of fashionable mothers committing their own children to the care of peasant foster mothers, instead of nursing their babes, while his whole ideal of education is democratic instead of aristocratic. This work is read and quoted largely by teachers and educational writers. Other works from the pen of Rousseau are "Discourse on Arts and Sciences," "Letters from the Mountain," "Confessions," "Rousseau's Dream," and numerous criticisms and musical productions.

ROUSSEAU, Lovell Harrison, lawyer and soldier, born in Lincoln County, Kentucky, Aug. 4, 1818; died Jan. 7, 1869. His education was limited to the common schools, but later he studied law and was admitted to the bar. He was a member of the Indiana Legislature from 1844 to 1845, became a member of the State senate in 1847, and soon after organized a company of Indiana troops for the Mexican War, serving under General Taylor in the Battle of Buena Vista and several others. After the close of the war he established a criminal law practice in Louisville, Ky., where he became a member of the State senate. In 1861 he entered the Union army for service in the Civil War, and as brigadier general commanded at the battles of Shiloh and Perryville in 1862. He was soon after made major general of volunteers, and commanded a division of the army of the Cumberland at Stone River, Chattanooga, and Chickamauga. In 1865 he became a member of Congress from Kentucky, and in 1867 was

brevetted major general and sent to Alaska to assume control of the territory purchased in that year from Russia. He was assigned to the command of the department of Louisiana in 1868.

ROUSSEAU, Pierre Étienne Théodore, landscape painter, born in Paris, France, April 15, 1812; died Dec. 22, 1867. He was the son of a tailor and studied in the École des Beaux-Arts. Later he traveled extensively to study landscape and sky effects, and in 1834 made his first exhibit at the Salon, where he received gold medals in 1849 and 1854. He was decorated with the cross of the Legion of Honor in 1852. Many of his works are highly meritorious on account of their excellent properties, exhibiting trueness to nature. His landscapes are among the best, and include "Early Summer Morning" and "Alley of Chestnut Trees."

ROWAN (rō'ān), **Stephen Clegg**, naval officer, born near Dublin, Ireland, Dec. 25, 1808; died in Washington, D. C., March 31, 1890. He came to the United States at an early age, studied at Oxford College, Ohio, and entered the United States navy as midshipman in 1826. After entering the military service, he assisted in the capture of Monterey and San Diego, in 1846, in the Mexican War, and in 1855 became commander. He served on the Potomac in 1861, and the following year commanded the fleet on Roanoke Island, securing the captaincy for capturing Fort Macon. From 1862 to 1864 he commanded the *New Ironsides* off Charleston. He was voted thanks by Congress soon after and in 1866 was promoted to be rear admiral. In 1872 he was made commander of the naval station at New York, president of the board of examiners in 1879, and superintendent of the naval observatory in 1882.

ROWAN TREE. See **Mountain Ash**.

ROWING, the art of propelling a boat or vessel by means of oars. The term *rowing* applies properly to the method of propelling a vessel by a number of men, each of whom handles an oar and is known as an *oarsman*, while the act of handling an oar by each hand is called *sculling*, and such oars are properly *sculls*. Rowing by means of oars was formerly an important enterprise and anciently much freighting was done by this means, but civilized nations have displaced it almost exclusively by the application of electric, gasoline, and steam power. Sculling is now carried on extensively in competitive races. In the larger exercises single sculling is almost universal, but in some instances a number of scullers work in unison, usually in pairs, fours, sixes, or eights.

Rowing is an ancient pastime and economic enterprise, but it did not become prominent as a sport until about the middle of the 19th century. Crews for rowing were organized at the leading colleges of Europe as early as 1820, and boats carrying from two to eight rowers soon came into use. Races have been held an-

nually by Cambridge and Oxford since 1856. The course employed chiefly by these institutions is on the Thames, from Putney bridge to Mortlake church, or the reverse, an expanse of four and a half miles. Up to the present the honors are about equal, though Oxford has a small lead in the scores. Regattas are maintained with great success in Germany, Holland, Denmark, and Sweden, and the contests are both national and international.

Rowing associations are maintained both in Canada and the United States, and these countries have had competitive tests with various associations of England, both at Henley and on the Thames. In 1873 was founded the National Association of Amateur Oarsmen, which is one of the leading American organizations, but there are many others, including the regattas on the Schuylkill River in Pennsylvania, the Hudson River in New York, and the course at New London, Conn.

ROWLAND (rō'lānd), **Henry Augustus**, physicist, born at Honesdale, Pa., Nov. 27, 1848; died April 16, 1901. In 1870 he graduated from the Rensselaer Polytechnic Institute at Troy, N. Y., having taken a complete course in civil engineering. He was made instructor at Wooster University, Ohio, and later was assistant professor at Rensselaer Polytechnic Institute. In 1875 he was made professor of physics in Johns Hopkins University, serving until the time of his death. To equip himself for this important position, he made an extended tour of Europe for the purpose of conducting scientific research, purchasing apparatus, and studying methods of instruction. As a physicist he takes rank as one of the most eminent of the 19th century. His investigations include a study of the magnetic properties of iron, of the solar spectrum, and of electric phenomena. He used photographic methods in the study of the spectrum and discovered the principal of the concave grating, which led him to construct an engine useful in the preparation of gratings. The Paris Exposition granted him a gold medal for the development of a system of multiplex telegraphy based on the use of synchronous motors, which has become of great value in the commercial world. Besides being a member of many learned societies of Europe and America, he was president of the American Physical Society. His publications include treatises entitled "Magnetic Effect of Electrical Connection," "Concave Gratings for Optical Purposes," "Mechanical Equivalent of Heat," "Magnetic Permeability and Maximum Magnetization of Nickel and Cobalt," "Absolute Unit of Electrical Resistance," and "Relative Wave Lengths at the Lines of the Solar Spectrum."

ROYAL GORGE, a celebrated cañon in Fremont County, Colorado, through which flows the Arkansas River. In many places it is skirted by bluffs that rise fully 3,000 feet above the river, which pursues a rapid and tortuous

course. The rocks are variously colored and grandly formed, giving the region a most picturesque and imposing aspect.

ROYAL INSTITUTION OF GREAT BRITAIN, an organization established in London, England, in 1799. It was chartered the following year under the name of the Royal Institution for the Promotion, Diffusion, and Extension of Science and Useful Knowledge. Scientific and literary research, the diffusion of experimental science, and the application of new discoveries to the arts are the principal objects of this institution. It has a library of 60,500 volumes and is supplied with a splendid collection of apparatus and scientific instruments. The election of new members is by ballot. Many bequests have been bestowed upon the institution, but support is provided for by an admission fee and annual subscription paid by the members. Benjamin Thompson, Count Rumford, originated the idea of such an institution. Among the lecturers may be named Sir Humphry Davy, John Tyndall, Michael Faraday, Thomas Young, Thomas H. Huxley, and many other men prominent in science.

ROYAL SOCIETY, The, an association for the advancement of mathematical and physical science, whose charter name is the Royal Society of London for Improving Natural Knowledge. It is the oldest scientific society in England, founded in 1660, and thus is one of the oldest in Europe. Weekly meetings are held from November to June for the purpose of discussions, which are preceded by the reading of papers on scientific subjects, after which the discussions are general. The *Philosophical Transactions*, founded in 1665, is an annual in which the more important papers and proceedings are published, and *The Proceedings*, first issued in 1880, is a periodical devoted to publishing abstracts of papers and accounts of general transactions. Fellows are elected by the members, the election occurring annually. The society is supported by an endowment and additional support is secured by each fellow contributing annually \$20, or a life payment of \$300. The membership comprises about 550 fellows. Since its organization nearly all the eminent men of Great Britain have been enrolled. The presidents have included Sir Isaac Newton, Samuel Pepys, Sir Hans Sloane, Sir Jay Banks, and Sir Humphry Davy.

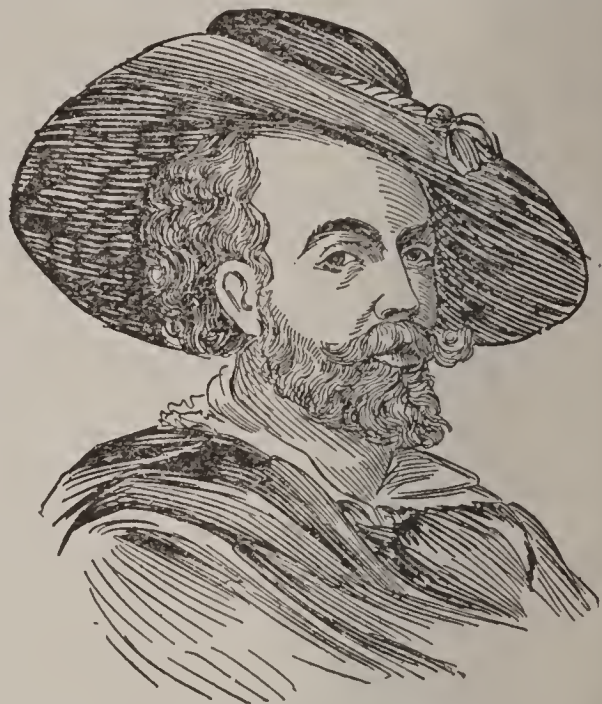
ROYAL SOCIETY OF CANADA, an institution founded at Ottawa, Canada, in 1882. It was promoted by the Marquess of Lorne and others, and the first meeting was presided over by Sir William Dawson. Four departments are maintained, including those of French-Canadian literature and history; English-Canadian literature and history; mathematical, physical and chemical sciences; and geological and biological sciences. Ottawa is the usual place of meeting and the meetings are held annually in May. This association has been prominent in general

research, especially in matters of discovery and in preserving historical records. The transactions are published annually at the expense of the Dominion government.

RUBBER. See **India Rubber.**

RUBENS (rōō'bēnz), **Peter Paul**, eminent painter, born at Siegen, Germany, June 29, 1577; died in Antwerp, May 30, 1640. He was the

son of a lawyer, who died in 1579, and his mother took him to Antwerp in 1587, where he studied in a Jesuit institution. His ability for painting began to be noticed at an early age by his aptness to produce draw-



PETER PAUL RUBENS.

ings and sketches, and he began to study art systematically in 1590. He became a master of the guild of painters in Antwerp in 1598, where he produced a number of paintings that attracted wide attention. In 1600 he proceeded to Italy to study and practice his art, spending his time mostly as court painter to the Duke of Mantua. On returning to Antwerp, he was made court painter to Archduke Albert with a good salary and soon after married Isabella Brant. Subsequently his time was devoted to the production of the masterpieces that have made him famous. Marie de' Medici invited him to France in 1621, where he designed a series of pictures illustrating the life of that princess, which were placed in the gallery of the Luxembourg. On returning to Antwerp, he was sent by Archduchess Isabella of the Netherlands on a mission to Spain to negotiate a peace treaty with Philip IV., and in 1630 was sent on a similar mission to England to treat with Charles I.

After accomplishing these missions, Rubens painted the portraits of the king, the queen, and many of the noted men of England. Charles I. of England and Philip IV. of Spain both knighted him. His wife, Isabella, died in 1626, and in 1630 he was married again, his second wife being Helena Fourment. Rubens accumulated a large fortune. He was a man of strongly marked character and his excellent and large number of productions place him at the head of the Flemish school. His paintings include landscapes, portraits, Bible subjects, historical views, and animals of all kinds. All his works are noted for their brilliancy and natural effect, many of them selling at enormous prices.

Among his most noted paintings are "Elevation to the Cross," "Descent from the Cross," "Mercury and Psyche," "Adoration of the Magi," "Assumption of the Virgin," "Massacre of the Innocents," and "Blessings of Peace." The works of Rubens are placed at about 2,500. His remains were buried in a private chapel called the Church of Saint James, in which many of his paintings may be seen and where a monument to him has been erected.

RUBICON (ru'bĭ-kŭn), a river of northern Italy, which flows into the Adriatic. It is of interest historically in connection with Caesar crossing the stream with an army in 49 B. C. The Rubicon was the boundary line that separated his province from the republic of Rome. His act of crossing the stream with an army at the outbreak of the civil war between him and Pompey constituted a declaration of war. Writers represent Caesar as hesitating before crossing the stream, and, while passing over, he is said to have uttered the words *Jacta est alea*, meaning "The die is cast." "Crossing the Rubicon" has since passed into proverb, and signifies the undertaking of a hazardous task. It is thought that the Rubicon is the river now known as the Fiumicino.

RUBIDIUM (ru-bĭd'ĭ-ŭm), one of the alkali metals. It was discovered by Bunsen and Kirchhof in 1860, while examining the waters of Dürkheim, Germany, by means of the spectroscope. This mineral occurs in minute proportions in association with caesium. It is silver white, is as soft as wax at ordinary temperatures, and oxidizes rapidly in the air. When raised to a dull red heat, it evolves a bluish vapor.

RUBINSTEIN (rōō'bĭn-stĭn), **Anton Gregorovich**, eminent composer and pianist, born in Wechwotynetz, Rumania, Nov. 30, 1830; died in Peterhof, Russia, Nov. 20, 1894. He descended from a German family of Jewish extraction, and, after receiving his first musical instruction from his mother, studied at Moscow, Paris, and Berlin. While at Paris he was instructed by Liszt and at Berlin by Dehn. After completing his studies in Berlin, he taught music in Vienna and later in Berlin, and in 1848 settled in Saint Petersburg. In 1857 he made a tour through Europe and the following year became conductor of the Imperial Concert, with a life pension, in Saint Petersburg, where he founded a conservatory of music in 1862. He visited Canada and the United States in 1872, meeting with enthusiastic receptions. Many sovereigns of Europe granted him distinguished honors. He received the insignia of the Legion of Honor in 1877 and was given a grand jubilee at Saint Petersburg in 1889. Rubinstein was prolific as a composer and masterful as a player. He differed materially from Wagner. In feeling he favored Mendelssohn and in style was quite like Schubert. Among his best known productions are the two sacred operas, "Paradise Lost" and

"Moses," the symphonies entitled "Ocean" and "Dramatic," and the operas entitled "Demon" and "Maccabees." He published "Autobiography of Anton Rubinstein" in 1890.

RUBLE (ru'b'l), a silver coin and unit of account in Russia. It began to be coined in the 15th century. The ruble is divided into 10 *grievens*, or 100 *kopecks*. In the money of Canada and the United States, the ruble has a value of 51.5 cents. Fractions of the ruble are in silver, while gold is coined in denominations of 5 rubles and of 10 rubles. Paper or bank rubles are in circulation, but these have a nominal value of about two-thirds of the silver coin.

RUBY (ru'bŷ), a transparent gem of a deep color, which is considered one of the most valuable of the precious stones. It is a species of sapphire, but differs from it in that the latter is of a bluish color and less hard, ruby being the hardest of all gems except the diamond. Ruby is rare, is seldom found of large size, and possesses great value. The value increases in proportion to its size. A ruby of five carats, if perfect in color, is valued at about ten times as much as a diamond of the same weight. Ruby of the kind described here is generally called *oriental ruby* to distinguish it from a less valuable variety known as *spinel ruby*. The former kind is a corundum formed largely of alumina, while the latter is an aluminate of magnesium and is inferior both in value and hardness. Jewelers often offer for sale articles of ornament containing spinel rubies, the oriental variety possessing a value too great to be generally purchased. Rubies are obtained in Burmah, Siam, Ceylon, and Australia. Inferior grades occur in America and also in the countries named. It is now possible to produce rubies chemically. The artificial kinds serve the purpose in watches equally as well as rubies produced in nature.

RUDDER (rŭd'dēr), a broad, flat device by which a boat or ship is steered, serving to change its course when swung to either side. It is hinged vertically to the stern port of a ship, or at the stern of a boat, and is so adjusted that it may be moved by means of a tiller or wheel. A rudder chain is shackled to the rudder by bolts immediately above the water line, but it is slack enough to permit the free motion of the rudder. This is necessary to prevent it from being lost in the event of its becoming detached from the ship.

RUDE (rud), **François**, sculptor, born at Dijon, France, Jan. 4, 1784; died Nov. 3, 1855. He first studied in an art school in his native town and subsequently at the École des Beaux Arts, in Paris. Later he studied art in Rome, where he was awarded a prize in 1812. In 1828 he returned to Paris, where he exhibited in the Salon. He is celebrated as a representative of the modern school of arts and was steady and arduous as a worker. His productions include a great many portraits and busts, among which may be mentioned those of Napoleon, Houdon

the sculptor, Marshal Ney, and Marshal Bertrand. Other productions include "Christ on the Cross," "Love the Conqueror," "Neapolitan Fisher Boy," and "Mercury Fastening His Winged Sandal."

RUFF, or **Reeve**, a genus of wading birds allied to the sandpiper. These birds are widely distributed in the northern parts of North America, Europe, and Asia. They inhabit marshy places, and are migratory in their habits. The length of the body is about twelve inches and the colors are various, but they are generally variegated brown or black above and white below. In all species the bill is long and slender and the wings are short. The male is peculiar for having a long ruff, formed of feathers, around the neck in the spring, which disappears after two months, but serves during the breeding season as a defense when fighting against other males. The fights occurring at that time are for the possession of the females, which are smaller than the males, and are called *reeves*. Ruffs feed on worms, seeds, and insects. They breed in the coarse grasses of marshes and swamps, where they construct nests in the early spring, the brood usually consisting of four. Their flesh is edible and much sought in the fall.

RUGBY (rŭg'bŷ), a town in England, on the Avon River, fifteen miles northeast of Warwick. It is surrounded by a fertile country, has convenient railroad facilities, and is noted as the seat of the celebrated Rugby School. This institution was founded by Laurence Sheriff, a grocer and merchant to Queen Elizabeth, in 1567. It first attained a national reputation when Dr. Thomas Arnold became master in 1828. Its endowments produce about \$25,000. It is attended by about 500 students. Among the famous students were Lord Derby, Matthew Arnold, Dean Stanley, and Thomas Hughes. The last named wrote "Tom Brown's Schooldays," a book still purchased largely for home and school libraries. The town of Rugby has a number of fine churches, hospitals, and associations. It has a brisk trade in produce and merchandise. Population, 1917, 14,408.

RÜGEN (rŭ'gən), an island in the Baltic Sea, off the coast of Pomerania, from which it is separated by a narrow channel. It is 33 miles long by 10 miles wide, and has an area of 390 square miles. The shore is very irregular, being indented by numerous bays, and the surface is generally undulating and fertile. It has no prominent elevations. Stubenkammer is the highest point, being a precipitous chalk cliff 410 feet above sea level. The principal productions include vegetables, cereals, and fish. Cattle and sheep are reared. A number of the coast towns are noted as popular resorts for sea-bathing and sight-seeing. Bergen, with a population of 6,106, is the chief town and seat of local government. The island belonged to Sweden until 1815, when it became a part of Prussia. It is now an in-

tegral part of the German Empire. Population, 1915, 48,959.

RUM, an alcoholic liquor distilled from the juice of sugar cane and from the drainings and scummings obtained in sugar making. The material used is first allowed to ferment and the liquor is then drawn off by a simple process of distillation, which is usually conducted in connection with the cane-sugar establishments. The best grade of rum is secured from the scummings taken from the sugar pans, a second grade is made from scummings and molasses, and an inferior grade is obtained from molasses alone. Rum is colorless as it issues from the still, but it is colored to suit the customer before it leaves the premises of the distiller. The most extensive productions are in connection with the manufacture of cane sugar in the West Indies and Central America, but inferior grades are made by flavoring plain spirit with rum and coloring with burnt sugar. *Jamaica rum* is considered the finest, but in late years the name has been applied to the best grades made anywhere. A pineapple flavor is often given to rum by bringing it in contact with sliced pineapples, when it is called *pineapple rum*. The French make a kind of rum known as *tafia*.

RUMANIA (rŭ-mă'nĭ-ă), or **Roumania**, a kingdom in the southeastern part of Europe, one of the Balkan states. It is bounded on the north by Galicia and Ukrania, east by Ukrania and the Black Sea, south by Bulgaria, and west by Servia and Hungary. The coast on the Black Sea is about 130 miles long. It is separated from Bulgaria by the Danube. The area is 50,715 square miles.

DESCRIPTION. The western part is mountainous, being traversed by the Carpathians and the Transylvanian Alps. Much of the surface is a low plain, but spurs of these mountains extend some distance inland. The highlands in the northern part serve as a great wall on the Austro-Hungarian frontier, the highest peaks rising about 800 feet above sea level. These highlands are cut deeply by river channels, which flow in valleys between spurs of the mountains. In the eastern part of the country is the Moldavian plain, and the Wallachian plain occupies the entire south, both of which are highly fertile.

All of Rumania lies in the Danube basin. The drainage is toward the south and east into the Black Sea. A part of the western and most of the southern boundaries are formed by the Danube River, which turns northward near Silistria, and, after being joined by the Pruth, it forms the boundary between the province of Dobrudja and Russia. The greater part of the Danube delta is included with Rumania. It contains the celebrated wall built by the Romans under Trajan in the 2d century from the vicinity of Kustenji to the Danube. Many small streams flow south from the northern border to join the Danube, including the Aluta, the Arjesh, and the Sereth.

The climate is subject to marked extremes. The summers are hot, the autumns are dry, and the winters are cold. In winter the winds blow from the Russian steppes and in summer, from the Mediterranean, making the latter subtropical. The extremes range from 20° below zero to 98° and even 104° in the shade. Heavy snows fall in the mountains. The rainfall ranges from 15 to 22 inches, but is not equally distributed. Much of the surface is highly fertile, particularly the black earth of the Danube basin. The country has a fine growth of timber.

MINING. The country possesses great mineral wealth, especially in coal, salt, and petroleum. In the output of petroleum Rumania ranks fifth with the nations of the world, but the capital invested to promote the enterprise is almost exclusively foreign, chiefly German and Dutch. Coal of a fine quality is obtained for domestic consumption and export. Salt has been mined for centuries. Other minerals include iron, gold, copper, lead, silver, and quicksilver. Clays suitable for brick and pottery and sands fitted for porcelain and glass wares are abundant. Granite, marble, and limestone are widely distributed and these minerals are quarried to a considerable extent for construction purposes. In Moldavia and Wallachia are beds of salt that have a thickness of 700 feet. Salt mining is a state monopoly.

AGRICULTURE. The lands were almost exclusively under feudal ownership from remote antiquity until 1864, when the government provided a popular loan of its resources to the people. Under it the peasants have come into possession of small farms, consisting mostly of ten-acre tracts, and the loan is being rapidly repaid under an installment system with low interest. Fully 70 per cent. of the people are engaged in farming and stock raising, but the methods are still primitive. Wheat and maize are the principal crops, the former being grown on 6,000 and the latter on 7,000 square miles. Other important crops include barley, oats, rye, tobacco, hemp, and vegetables. Fruit growing receives marked attention, especially grapes, prunes, and apples. Sheep are grown in large numbers in the highlands in the north, where grazing is profitable. Cattle are reared for meat and dairying. Other live stock includes horses, swine, and poultry.

MANUFACTURES AND COMMERCE. Formerly a large part of the manufactured products were produced in small establishments, but the factory system is developing rapidly. Flour is made in large quantities for export. Sugar is manufactured of beets and is sufficient to supply the home demand. Butter and cheese of a superior grade are made, both from the milk of cows and goats, and in the output of wines Rumania vies with Hungary. Extensive petroleum refineries are operated. Other manufactures include soap, leather, cement, glass, cloth and hosiery, furniture, machinery, and cigars. Foreign trade is largely with Austria-Hungary, Germany, France, and Great Britain. Flour,

wines, hides, and fruits are the principal exports. The imports include textiles and metal manufactures.

COMMUNICATION. The Danube is important as a highway of commerce, since it furnishes a continuous route from the Black Sea to the western border. It has been improved in many places by dredging and the construction of canals. Deep-water navigation on the Danube extends to Galatz and Braila. Kustendje, on the Black Sea, has direct railway communication with the interior, where lines of railroads extend in all directions, furnishing communication with commercial centers in Russia and Austria-Hungary. About 2,550 miles of railways are in operation and these are owned by the state. Bucharest, Jassy, and other cities have electric railways, many of which extend to rural districts and interior towns.

GOVERNMENT. The government is a constitutional monarchy and the king holds his office by heredity. He is assisted by a cabinet of eight members and has power to veto acts of the legislature. Legislation is vested in a congress of two houses, the senate and chamber of deputies, members of both branches of which are chosen by electoral colleges. The senators, of whom there are 120, are elected for a term of eight years. This branch includes the heir apparent, two representatives selected by the universities of Jassy and Bucharest, and eight bishops. In the chamber of deputies are 183 members, all chosen for four years. Rumania is divided into 32 districts for local government. It consists of the three provinces of Moldavia, Wallachia, and Dobrudja, all of which are under state or provincial governments.

EDUCATION. Though school attendance is free and compulsory, illiteracy among the adult population is about 88 per cent. No schools have been established in many of the village communes, hence education is still backward and the school attendance is comparatively small. Two universities are maintained, one at Jassy and one at Bucharest, the former having an attendance of 800 and the latter having an attendance of about 4,100 students. Secondary schools have been provided in many of the towns and cities, but the normal training of teachers is still greatly neglected.

INHABITANTS. The Rumanians call themselves *Romani* and are descendants from a colony of Romans established by Trajan. At present the language spoken is constituted of many dialects, but they may be classed generally with the Romanic tongues. The Greek population is 15,500; the Magyar, 50,000; the German, 85,000; the Bulgarian, 110,000; the Gypsy, 200,000; and the Jewish, 425,000. Religious worship is free, but Orthodox Greek is the state religion, to which the people generally belong. The Protestants number 27,000; the Mohammedans, 30,000; the Roman Catholics, 132,000; and the Hebrews, 300,000. Bucharest is the capital and the largest

city. Other important cities include Jassy, Galatz, Braila, Craiova, and Ploësti. Population, 1906, 6,585,534; in 1914, 7,508,009.

HISTORY. The region now included in Rumania formed part of Dacia in ancient times. Trajan made it a province of Rome in 106 A. D., when extensive Roman colonies were established. It was overrun by the military hordes of barbarians, including the Goths, Huns, Bulgars, and Slavs, in the early centuries of our era, all leaving traces of their occupation on the people and architecture to the present time. The Bulgarian kingdom annexed it in the 9th century, but it was joined to the Eastern Roman Empire, in 1019, and soon after became a part of Turkey. Turkish occupation was disturbed at various times by insurrections and wars. With the beginning of hostilities between Russia and Turkey, in 1768, Turkish influence began to wane. This may be attributed to the fact that both the Rumanians and Russians belong largely to the Greek church, and Russia claimed a protectorate over its fellow Christians against Turkish atrocities committed in the Balkan region.

The Crimean War (q. v.) was followed by the Treaty of Paris, in 1856, which, while recognizing the suzerainty of Turkey, added a part of Bessarabia to the principalities of the Danube and made ample provision for maintaining the rights and privileges of the Balkan States. Moldavia and Wallachia were united under one ruler in 1858, and three years later a national union was formed under a prince. At the beginning of the Russo-Turkish War, in 1877, Rumania permitted the free passage of Russian troops across its territory, which action caused Turkey to proclaim war against the Rumanians.

Moldavia and Wallachia were provinces of Turkey for many years, but secured an independent government after the Russo-Turkish War. The Treaty of Berlin, in 1878, recognized the independence of the two united provinces and approved the annexation of Dobrudja, in return for which Bessarabia was ceded to Russia. Charles I. was chosen Lord of Rumania in 1866 and was proclaimed king in 1881. On his death, in 1914, he was succeeded by Ferdinand I., the present king. Rumania joined the Entente Allies in 1916 and met defeat and in 1918 negotiated a peace treaty, which was repudiated when the Central Powers were defeated. In the final settlement Rumania received territory from Russia, Bulgaria and Austria-Hungary.

RUMELIA (rōō-mē'li-à), or **Roumelia**, a region of Southern Europe, extending from the Black Sea to Albania and from the Balkan Mountains to the Aegean Sea. *Eastern Rumelia* long formed a part of Turkey, but, by the Treaty of Berlin, in 1878, its government under Turkey became autonomous and the following year it united with Bulgaria. See **Bulgaria**.

RUMFORD, town of Oxford County, Me., 50 miles northeast of Augusta, on the Androscoggin River and on the Maine Central Railroad. It has

large paper and pulp mills. The chief buildings include the public library, high school, and Mechanics' Institute. It was settled in 1892 and incorporated in 1895. Population, 1920, 7,016.

RUMINANTS (rū'mī-nānts), the name of a large group of grazing animals, distinguished in that they chew a cud. They were classed as *Ruminantia* by Cuvier, but are now regarded as a group of the cloven-hoofed, or even-toed, ungulates. Nearly all the animals of this group have a stomach composed of four distinct bags, or cavities, but in some it is divided imperfectly into four chambers, while in others there are only three cavities. When grass or other food is swallowed, it passes by the gullet into the largest cavity of the stomach, called the *paunch*, or *rumen*, where it is soaked with a fluid. The second pouch, which is connected with the gullet, receives the fluids direct, though in some species a part of the liquids enter into other cavities. A direct connection also exists between the gullet and the third pouch, which is lined with a membrane which has many deep folds and hard tubercles. The fourth cavity, called the *reed*, or *rennet*, is lined with a mucous membrane that secretes the gastric juice.

The food passes at the will of the animal into the first or second cavity, but such foods as hay and grasses are deposited in the former, the paunch. When this is well filled and the animal is at rest, a portion is brought up and chewed slowly between the large molar teeth. This process, called *chewing the cud*, or *ruminating*, may occur when the animal is standing or laying down. After the food is chewed and thoroughly mixed with saliva, it is reswallowed and passes by the first two pouches into the third, whence it passes on into the fourth pouch and finally into the intestines. All the cloven-hoofed herbivorous animals, except the swine and hippopotamuses, are ruminants. They include the antelopes, camels, cattle, deer, giraffes, goats, musk ox, and sheep.

RUMP PARLIAMENT, the popular name given in English history to a remnant of the Long Parliament. The soldiers under Cromwell expelled three-fourths of the members of parliament on Dec. 6, 1648, these being known as the Pride's Purge, while the remaining sixty members constituted the Rump Parliament. This body coöperated with Cromwell in the trial and condemnation of Charles I. After resisting certain encroachments of the army, this body was dissolved, in 1653, but was restored during the protectorate of Richard Cromwell. It was again expelled in 1659, was restored in 1660, and finally dissolved by its own decree on March 16, 1660.

RUNEBERG (rōō'ne-bër-y'), **Johan Ludwig**, eminent Swedish poet, born at Jacobstad, Finland, Feb. 5, 1804; died at Borga, May 6, 1877. He was the son of a sea captain, who provided him with facilities for a good education, which included an extensive research in litera-

ture and a knowledge of Greek. In 1830 he was made teacher of Latin literature in the University of Åbo, a city of Russian Finland, and later in the Lyceum. Many of his poems show the influence of Goethe and Greek writers, but his originality must be conceded. It may be said that they attained the highest ideal of imaginative literature in Sweden, and reflect the deepest feelings of regard and nationalism manifest by the Scandinavian peoples. Among his best known works are "The Elkhunters," an epic idyll, "King Fjalar," "Christmas Eve," "Ensign Stals' Stories," and "Hanna."

RUNES (rūnz), a system of writing used among the Germanic peoples at an early date, of which mention was first made in the 6th century A. D. It consisted of sixteen letters, but the number of characters was extended later by the Germans to 24 and afterward to 40. Many inscriptions in the runes have been found in various parts of Europe. In Sweden these inscriptions are chiefly on rock or stone monuments, of which many specimens have been found in the vicinity of Upsala. These inscriptions are in Icelandic with runic characters. In Denmark verses have been found engraved upon monuments, but in some localities they are on arms, amulets, wooden tablets, and instruments of various kinds. Runic manuscripts, including a collection of laws written in the 13th century, are preserved in the library of the University at Copenhagen. An Icelandic prayer that victory should crown the arms of Herold against the Swedish king Sigurd, in 735, was discovered on a rock in the southern part of Sweden. Writings of this character were found in some parts of England, especially in the regions formerly known as Mercia and Northumbria. Since magical influences were attributed to the runic writings, they were succeeded by other systems through the influence of Christian missionaries, though a few Christian inscriptions in the runic characters have been discovered.

RUNJIT SINGH (rūn-jēt' sīng'h'), founder of the Sikh kingdom, born near Lahore, India, Nov. 2, 1780; died June 27, 1839. He was the son of Maha Singh, governor of a Sikh province, whom he succeeded at the age of twelve years, under the regency of his mother. In 1799 he assumed full power and soon subjugated many neighboring chiefs. Some of his opponents formed an alliance with the East India Company, in 1809, when a British army was sent against him and he was compelled to sue for peace. Soon after he conducted a war against Afghanistan. In 1819 he conquered Kashmir and later Peshawur, when he had himself crowned as maharajah, meaning king of kings. At the time of his death he was ruler over a region that comprised a population of 20,500,000 people.

RUNNYMEDE (rūn'nī-mēd), or **Runni-mede**, a narrow strip of meadow land on the bank of the Thames, in the northwestern part of

the county of Surry, England. It is memorable as the place where King John, in 1215, was compelled by his barons to grant the privileges of the Magna Charta. This tract of land now contains the Egham race course, so named from the town near by.

RUNYON, Theodore, soldier and diplomat, born in Somerville, N. J., Oct. 25, 1822; died Jan. 27, 1896. He graduated from Yale University in 1842, was admitted to the bar in 1846, and soon after established a lucrative practice in Newark, N. J., where he held several important city positions. The State authorities employed him to codify the militia laws of New Jersey, in 1856, and soon after he was made major general of the national guard of that State. He commanded a brigade of volunteers at the beginning of the Civil War, but soon after returned to the law practice. From 1873 to 1887 he was chancellor of State. In 1893 he was appointed minister to Germany by President Cleveland and later was made ambassador to the same country. Runyon received the degree of law from Yale University and from Wesleyan and Rutgers colleges.

RUPEE (rū-pē'), a silver coin of British India, the standard unit of exchange in that country. It was first coined in 1542, but the value and fineness varied somewhat in different periods and various portions of the country. The rupee is equal to sixteen *annas*, while 100,000 rupees equal a *lac*, and 100 lacs make a *crore*. Formerly the nominal value was about 50 cents, but the depreciation of silver causes it to fluctuate between 30 and 48 cents. The denominations coined are one, half, quarter, and eighth rupees.

RUPERT (rōō'pērt), Prince of Bavaria, third son of Frederick V., King of Bohemia, and of Elizabeth, daughter of James I. of England. He was born at Prague, Hungary, Dec. 18, 1619; died in London, England, Nov. 29, 1682. In 1630 he entered the University of Leyden and afterward took an extensive course in languages and military discipline. He was made master of arts by the Oxford University in 1636. Two years later he took part in the siege of Breda. In the Battle of Lemgo the Austrians took him prisoner, when he was confined for three years at Lintz. After being released, in 1642, he proceeded to England, where he was made commander of a regiment in the Civil War by Charles I. His career promised to be of value to the royal cause from the first, since he was daring in leading his army, but he was extremely rash in venturing into battle against great odds.

Prince Rupert fought with remarkable activity at Worcester, Edgehill, and Brentford and routed the Scots at Marston Moor, but was defeated by Cromwell's Ironsides. In 1645 he succeeded in a number of other battles, but was besieged at Bristol and was compelled to surrender after a siege of three weeks. Charles became impatient at his losses and had him

court-martialed, but he was cleared from blame and reinstated. Rupert won a number of victories soon after, but was captured at Oxford. He sailed to France at the demand of the Parliament, where he was made marshal, and, after receiving a wound at Armentières, in 1647, he accompanied the Prince of Wales to The Hague.

Charles soon after made Prince Rupert admiral of the fleet for remaining true to the royalists, and he sailed on an expedition of organized piracy against his opponents. However, most of his vessels were destroyed in a battle, and he was defeated by Admiral Blake at Malaga in 1651. He escaped with the remaining vessels to the West Indies, where he was joined by his brother, Maurice, and the two practiced piracy upon English and merchant vessels until 1653, when he returned to France. In 1660 he returned to England and four years later sailed as commander of a fleet against the Dutch in Guiana, where he gained signal victories and received the thanks of the House of Commons. Rupert devoted the later part of his life to scientific study. He is the inventor of a form of gunpowder and the discoverer of improvements in the art of mezzotint engraving. He was the first governor of the Hudson Bay Company. From him the curious glass bubbles known as *Prince Rupert's drops* derived their name.

RUPERT'S LAND, an extensive region of Canada, so named from Prince Rupert, who was one of the founders and first governor of the Hudson Bay Company. The region includes what is now Manitoba, Alberta, Saskatchewan, and a large part of Keewatin. Subsequently it was transferred to the Hudson Bay Company and in 1870 was admitted into the Dominion of Canada. See **Hudson's Bay Company**.

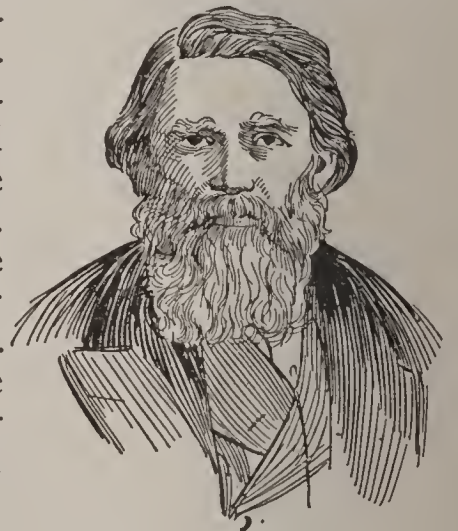
RUSH, the name of several plants belonging to the Sedge family. Most species are grasslike herbs with jointed stems. They are either leafless or bear flattened, knotted leaves and greenish or brownish flowers. The *common rush* has a perennial root and the stem is filled with a spongy pith. A species known as *black grass* is cut for hay early in the season. Many of these plants are valuable in the industries, since they furnish material for mats, thatching, twine, and chair bottoms. They grow in moist meadows and swampy places.

RUSH, Benjamin, eminent physician, born in Philadelphia, Pa., Dec. 24, 1745; died April 19, 1813. He descended from a family of Quakers that came to America with William Penn in 1683, and, after graduating at Princeton in 1760, he studied two years in Edinburgh, Scotland, where he secured a degree in 1768. Soon after he returned to America. He became professor of chemistry in the Philadelphia Medical College and at the same time built up a reputation as medical practitioner. In 1774 he joined James Pemberton in founding the first anti-slavery society in America, and became noted as a leading spirit in the political movements pre-

ceding the Revolution. He served as a member of the Continental Congress, in 1776, and was a signer of the Declaration of Independence. Until 1778 he was physician general of the army, and in 1787 sat as a member of the Philadelphia convention that adopted the Federal Constitution. Rush was versatile as a writer and eminent as a physician. His last public office was that of treasurer of the United States mint in 1799, serving in that position until 1813. Among his numerous writings are "Diseases of the Mind," "Medical Inquiries and Observations," and "Medical Tracts."

RUSK, Jeremiah McLain, soldier and statesman, born in Morgan County, Ohio, June 17, 1830; died in Viroqua, Wis., Nov. 21, 1893. He was brought up on a farm and attended school in Ohio, but removed to Wisconsin in 1853 and engaged in farming. In 1862 he entered the Union army, serving until the close of the war. He attained to the rank of brigadier general in 1865. He was bank comptroller of Wisconsin from 1866 to 1870, served as a Republican in Congress from 1871 to 1877, and was Governor of Wisconsin from 1882 until 1889. President Harrison made him Secretary of Agriculture in the latter year, and at the close of his term he retired to Viroqua.

RUSKIN (rŭs'kĭn), **John**, prose writer and art critic, born in London, England, Feb. 8, 1819; died Jan. 20, 1900. He was the son of a wealthy wine merchant and was instructed privately until he entered Oxford University, where he graduated in 1842. While at school he manifested a taste for literature and art. After graduating, he studied painting under Copley Fielding and received inspirations from the noted works of Rembrandt and



JOHN RUSKIN.

Rubens. His whole life was one of busy study and work, and it may be said to have been quite as uneventful as that of a teacher and writer usually is. The first work from his pen was his "Modern Painters," in 1843, but previous to that he had published his poem on "Salsette and Elephantia," which gained the Newdigate prize at Oxford. In the "Modern Painters" he discussed the principles of art and called attention to the superiority of modern painters to the older masters. This work was published in five volumes, the last appearing in 1860, thus forming a very comprehensive treatise on the subject. He next passed to a study of architecture, which resulted in his "Seven Lamps of Architecture," in 1849, and followed it by his "Stones of Venice," the last volume of the latter appearing in 1853. About that time he lectured on drawing, defended Pre-

Raphaelitism, and wrote books on political economy. He made contributions to periodicals and prepared treatises on social, art, and ethical subjects.

Ruskin lectured at Cambridge a number of years, was professor of fine art at Oxford, and founded Saint George's Guild at Oxford, an institution designed to inculcate a habit in young and old to do manual labor. He became the publisher of his own books in 1873, finding it more agreeable to his particular taste in securing the exact composition and printing that he desired. It may be said of Ruskin that few lives present greater lessons of industry than his, while few writers have attained to such lofty enthusiasm for truth and beauty. None have shown greater eloquence and force, or exhibited a more generous sympathy for the needy and those wishing to make the best of life. His books are read and studied with enthusiasm both in America and Europe, and have found their way into many school and home libraries. The most noteworthy not named include "The King of the Golden River," a fairy story; "The Crown of Wild Olive," essays on work; "Sesame and Lilies;" "Pleasures of England;" "Mornings in Florence;" "Ethics of the Dust;" "Elements of English Prosody;" "Queen of the Air;" "Two Paths;" "Poetry of Architecture;" "Saint Mark's Rest;" and "Arrows of the Chase."

RUSSELL (rüs'sël), **Sir Charles Arthur**, eminent jurist, born near Newry, Ireland, in 1832; died Aug. 10, 1900. He descended from a family of Roman Catholics, four of his brothers entering the service of the church. After studying at Dublin University, he turned his attention to law, but in 1851 sought greater possibilities in London. He first engaged as a reporter on several papers, studying law in the meantime, and was admitted to the bar at Lincoln's Inn in 1859. His success was assured by reason of industry and ability, rising to become Queen's counsel in 1872, and in 1880 he was chosen a member of Parliament. There he supported the Home Rule policy of Gladstone in a masterful and influential way, was knighted in 1886, and in 1894 was made Lord Chief Justice of England as successor to Lord Coleridge. He visited Canada and the United States in 1896 and delivered an address before the Bar Association of America, at Saratoga Springs, N. Y., on "International Arbitration." Lord Russell ranked as a persuasive and energetic speaker. He presided over the trial of Leander Starr Jameson, in 1896, and subsequently over other equally noted cases.

RUSSELL, John, Earl, statesman, born in London, England, Aug. 18, 1792; died May 28, 1878. He was the third son of John, sixth Duke of Bedford, studied at the University of Edinburgh, and in 1813 was elected a member of Parliament. His influence became assured from the first by reason of his eminent ability as a speaker. He attracted much attention by an address in opposition to a union of Sweden

and Norway. In 1819 he delivered an address in favor of parliamentary reform, a question in which he took special interest during his entire political career, and in 1830 assisted in framing a reform bill. He became Home Secretary in the second Cabinet of Lord Melbourne, in 1835, and was made Colonial Secretary in 1839, introducing many important bills during the period. When Peel began to agitate the Corn Laws, Russell opposed him with much vigor from 1841 to 1845, but in the latter year wrote a letter in favor of repealing the Corn Laws, which, on being published, caused general discussion in England. Peel resigned in 1846 and Russell formed a new ministry, which remained in office until 1852, when it fell on account of the famine and a rebellion in Ireland. He entered the office of Foreign Secretary under Lord Aberdeen the same year, and in 1855 became Colonial Secretary in the Cabinet formed by Lord Palmerston. In 1865 he succeeded to the leadership of the Liberal party, but resigned the following year because his new reform bill failed, and henceforth held no office. Russell was not only an eminent leader and statesman, but ranks high as a writer. His principal works include "History of the British Constitution," "Life of Thomas Moore," "Recollections and Suggestions," "Rise and Progress of the Christian Religion in Western Europe," and "Life and Times."

RUSSELL, John Scott, naval engineer, born at Parkhead, Scotland, in 1808; died June 8, 1882. He studied at the universities of Glasgow and Edinburgh and in 1832 became a lecturer at the latter institution. The following year he began to manufacture small steamers and steam carriages. After studying the nature of waves, he introduced the wave system into the construction of ocean steamships at London. Many large vessels were constructed under his supervision, including the *Warrior* and the *Great Eastern*. In 1873 he was the chief engineer in the construction of the vast dome at Vienna, Austria, which had an expanse of 360 feet and was one of the objects of attraction at the great exhibition. He contributed to many works of reference and published "The Modern System of Naval Architecture."

RUSSELL, Sol Smith, actor, born at Brunswick, Me., in 1848; died in 1902. He became a drummer in the Federal army at the beginning of the Civil War and in 1864 played at a theater in Cairo, Ill. In 1865 he won much applause as a lyceum entertainer at Saint Louis. Soon after he became connected with Daly's company in New York City. For some time he starred in a play called "Edgewood Folks." Ill-health compelled him to retire from the stage in 1900. His greatest successes were made in "A Poor Relation," "A Bachelor's Romance," and "The Hon. John Grigsby."

RUSSELL, William, Lord, patriot and statesman, born Sept. 29, 1639; died July 1, 1683. After graduating from Cambridge, he traveled

in Europe, and in 1660 became a member of Parliament. He took little part in public debates until 1673, when he became a recognized leader of the Protestants in England, and subsequently was prominent as an opponent of King Charles and the Catholics. In 1680 he joined others in planning to secure a Protestant king of England and, as a means of retaliating, the opposition accused him of being implicated in the Rye-House Plot, but it was afterward learned that he had no knowledge of this or of any plan to raise an insurrection against the king. However, he was arrested on a charge of having plotted against the king and was accordingly condemned to be executed. Many attempts were made to save his life, but, as the king would not yield, Russell himself refused every other means, though an opportunity was given him to escape. His life stands as an example of a Christian martyr. Algernon Sidney, his fellow victim, was executed before the close of the year.

RUSSELL, William Clark, novelist, born in New York City, Feb. 24, 1844; died Nov. 8, 1911. His father, an Englishman, was a favorite concert singer in New York and a composer of songs. The son was educated at Winchester, England, and in France. He began sea life as a midshipman in 1857, and as such made several voyages to Asia and Australia. In 1865 he abandoned naval employment and turned his attention to literature, contributing to several London periodicals and writing a few novels under a nom de plume. His first literary work of considerable merit was a sea tale called "John Holdsworth, Chief Mate." This was followed by other writings of the same character. He served for some time on the staff of the London *Daily Telegraph*, which position he resigned in 1887. His writings include "What Cheer," "An Ocean Tragedy," "Frozen Pirate," "A Sea Queen," "The Wreck of the Grosvenor," "The Romance of a Midshipman," "A Book of the Hammock," "The Yarn of Old Harbour Tower," and "Life of Lord Nelson."

RUSSELL, William Eustis, lawyer and statesman, born in Cambridge, Mass., Jan. 6, 1857; died July 16, 1896. He graduated from Harvard University in 1877 and, after attending the Boston University Law School, was admitted to the bar. After establishing a successful practice in Cambridge, he served as mayor four years, and was elected Governor of Massachusetts as a Democrat for three terms, in 1889, 1891, and 1892. Russell resumed his law practice after the expiration of his term as Governor. He was one of the leading lawyers of the State and contributed to a number of journals and magazines.

RUSSELL, Sir William Howard, journalist, born in Lilyvale, Ireland, March 28, 1820; died Feb. 10, 1907. He studied at Trinity College, was admitted to the bar in 1850, and served as correspondent of the London *Times* in the Crimean War. It was Russell who made public the

sufferings of the British soldiers in their winter quarters, which caused the British ministry to be succeeded by one pledged to military reform. He corresponded for the London *Times* from the beginning of the mutiny in India, in 1857. The following year he founded the *Army and Navy Gazette*, in which he supported progressive views in military and naval affairs. At the time of the Civil War in the United States he corresponded from America, accompanying General McDowell and others. In 1866 he reported the war between Prussia and Austria, and in 1870, between France and Germany. Later he accompanied the British army to South Africa to report the events in the Zulu troubles. He was granted the Iron Cross in Germany, the Legion of Honor in France, and in 1895 was knighted by the queen. Among his numerous writings are "Dairy in India," "Letters from the Crimea," "My Dairy North and South," and "Canada, Its Defenses, Condition and Resources."

RUSSIA (rûsh'â), an extensive country of Europe and Asia, embracing about one-sixth of the land area of the earth. It is about three times as large as the United States, exclusive of Alaska, and is exceeded in size only by Great Britain. The total area is 8,660,394 square miles, of which 2,095,616 square miles are in Europe. It embraces 56 per cent. of Europe and all of Northern Asia, extending from the Baltic Sea and the Gulf of Bothnia, in the West, to the Bering Sea and the Sea of Okhotsk in the East. Asiatic Russia comprises about 38 per cent. of Asia. The empire is bounded on the north by the Arctic Ocean; east by Bering Strait and the Pacific Ocean; south by the Chinese Empire, Afghanistan, Persia, Turkey in Asia, and the Black Sea; and west by Rumania, Austria-Hungary, Germany, the Baltic Sea, the Gulf of Bothnia, Sweden, and Norway. The extreme length from east to west is about 7,000 miles, this being the distance from the border of Poland to the Sea of Okhotsk, and the width from north to south is 2,175 miles. Russia includes by far the largest region lying contiguous within a single government.

European Russia is divided into fifty provinces, but Russia in Europe includes, besides these, the Grand Duchy of Finland and the ten governments of Russian Poland. Several popular designations are used for convenience in describing particular regions of Russia in Europe. These embrace *South Russia*, along the northern shore of the Black Sea; *Little Russia*, immediately north of South Russia; *Great Russia*, extending through the center from Little Russia to the Arctic Ocean; *East Russia*, lying west of the Ural Mountains and the Ural River; *West Russia*, bordering on the Baltic Sea and Germany; and *White Russia*, embracing the northwestern part. Russia in Asia embraces Western Siberia, Eastern Siberia, Turkestan, Northern Caucasia, Transcaspia, Transcaucasia, Kirghiz Steppes, Amur, and the Maritime Prov-

inces. Saint Petersburg is the capital of all the Russias and the largest city of the empire.

DESCRIPTION. Russia in Europe includes the vast region lying north of the Black Sea and the Caucasus Mountains and east of Sweden, Germany, Austria-Hungary, and Rumania. The surface consists chiefly of an immense plain, which is well watered by numerous rivers and many small streams. The Valdai Hills form the only elevated region of the interior. They are situated between Moscow and Saint Petersburg, forming the important interior watershed, though their average height is only 500 feet, and the most elevated peaks are about 1,200 feet above sea level. On the eastern boundary are ranges of the Ural Mountains, which separate Northern Europe from Asia. Between the Caspian and Black seas trend the Caucasus Mountains, which separate the valley of the Terek from that of the Kura, and on the southern shore of the Crimea are the Taurida Mountains. Mount Elbruz, 18,570 feet high, is the most elevated peak of the Caucasus Mountains and of Europe. The highest elevations of the Ural Mountains do not exceed 7,000 feet, and those of the Taurida are not over 4,000 feet.

The inland waters of Russia include a number of valuable lakes, all of which are in the north-western part, embracing lakes Onega, Ladoga, Sego, Bieloe, Saima, Ulea, and many others. The White Sea is the principal coast indentation from the Arctic and the gulfs of Finland and Riga, from the Baltic. In the southern part is the Sea of Azov, while the Black and Caspian seas, both on the southern border, are important for supplying navigation facilities. The principal inland waters in Asia, belonging to Russia, include the Aral Sea and the lakes of Balkash, Baikal, Issyk-kul, and Chany. Most of the drainage in Europe is toward the south. The Volga and Ural rivers flow into the Caspian Sea; the Don, into the Sea of Azov; and the Bug, Pruth, Dnieper, and Dniester, into the Black Sea. The Baltic Sea receives the waters of the Vistula, Niemen, Duna, Neva, and Narova and the Arctic receives those of the northern Dwina, Onega, Petchora, and Mezen. Asiatic Russia also has a large number of important rivers, many of which are partly frozen the greater portion of the year. Those flowing into the Arctic include the Lena, Indigirka, Yenisei, and Obi. The southeastern part is drained largely by the Amur and the southwestern part, into inland seas, chiefly by the Oxus (Amu) and the Syr-daria.

CLIMATE. The climate is distinctly continental, but it is greatly diversified on account of the immense extent of the empire. The winters are colder and the summers are hotter than in the same latitudes of the countries in Europe, but the annual temperature is somewhat higher in the West than in the East. This is due to the fact that the East has a higher elevation above sea level and is influenced noticeably by the

Pacific Ocean. In the southern part the climate is favorable to the growth of sugar cane, the vine, and other fruits, but there is a gradual decrease in vegetable forms toward the north, until the Arctic region is reached, where only slight traces of lichen and mosses prevail. Winds sweep across the country from the north and the south, owing to the absence of mountain barriers, and changes in temperature are quite sudden and violent.

At Saint Petersburg the mean temperature is 15° in January and 65° in July, but in the southern part, adjacent to the Caspian Sea, the summers are very hot, with extremes of 96° to 110° . Astrakhan and the country surrounding the Aral Sea have a very slight rainfall, ranging from four to ten inches per year, but it increases toward the northwest, being about twenty-two inches at Saint Petersburg. The rainfall in the entire country is given at twenty inches. Snow falls in all parts of Russia, but remains only a short time in the southern part, while the northern section has localities that are covered with snow perpetually. In general the climate is healthful and bracing, well calculated to support a hardy and vigorous people.

FLORA AND FAUNA. Few regions of equal extent have a more fertile soil than is found in the Russian possessions, but the country has vast sandy tracts, morasses, and swamps. The greater part of the unproductive surface is in the vicinity of the Caspian and Aral seas, owing to the arid climate and the presence of large deserts or sandy wastes. Swamps of considerable extent abound north of Saint Petersburg, and unproductive regions stretch through the country between the Obi River and the Ural Mountains. However, a large part of both European and Asiatic Russia consists of a rich, black loam of great fertility. The forests are boundless and extend far toward the north, but the size of the trees gradually diminishes toward the Arctic seas, where only small shrubs are found in isolated tracts. Fully 40 per cent. of the country is still covered with timber, including the birch, larch, fir, alder, oak, hornbeam, maple, ash, and conifers.

In the northern section are many wild animals of large size, such as the polar bear, elk, and deer. Other animals include the wolf, lynx, wild boar, glutton, and wild fowl. The beaver is found in large numbers in the government of Minsk. Foxes, squirrels, partridges, and hazel hens are numerous in the central part. Cod and salmon are found in large numbers off the northwestern coast. Seal fishing is prolific in the Arctic. Herring, sturgeon, and other valuable fishes are taken in large numbers from the seas, lakes, and rivers. Bird life is well represented in the southern and central parts, but is very scant along the coasts of the Arctic.

MINING. Russia has deposits of practically all the minerals, and most of those which enter the important industries are found in large quanti-

ries. Mining has received attention for many centuries, but its extensive development is of comparatively recent date. Anthracite coal is mined near the Donets River. Extensive fields of bituminous coals are worked in Poland, Silesia, and many sections of Siberia. Though the annual output is 18,500,000 tons, it is scarcely sufficient to supply the demand for all purposes. Iron ore occurs in the Urals and in the central and southern parts of Russia, the annual yield being 3,500,000 tons. Copper is obtained chiefly in the Urals and the Caucasus, but productive fields are worked on a lesser scale from Finland to Poland. Russia produces more platinum than all the countries of the world combined, furnishing about 90 per cent. of the entire output. In the production of petroleum it holds a high rank, the output of crude oil averaging about 80,500,000 barrels per year. It is obtained chiefly in the celebrated fields of Baku, in Transcaucasia, which rank among the greatest sources of mineral oil in the world. The larger supply of gold is obtained in the Ural Mountains and in Siberia, where auriferous veins are worked extensively. Peat bogs furnish fuel and are worked in the vicinity of Moscow and along the Baltic. Building stones and fire and brick clays are widely distributed. Other minerals include zinc, salt, mercury, jasper, lead, manganese, amethyst, and diamonds. Amber of fine quality is found on the Baltic.

AGRICULTURE. About four-fifths of the inhabitants are engaged in agricultural enterprises, although the tundras in the north and the steppes of the Caspian are not fitted for cultivation. Besides, western Russia has large regions of unproductive salt lands. However, large areas consist of black soil of great fertility, including some of the richest wheat land in the world. Primitive methods of farming are still in vogue, but modern machinery is coming slowly into use. It exceeds any other country in the world in the production of flax, hemp, and wheat, and produces about half the rye and two-thirds of the oats grown in Europe. In the production of barley it exceeds any other country of the Old World. The larger part of the wheat grown is confined to the southwestern section, while rye and barley are cultivated extensively in the north, though they thrive in all parts where farming is possible. Maize yields well in the southwestern section, where it is rotated by seasons with wheat and oats. Fruits are grown extensively in the southern and central parts, especially apricots, apples, plums, grapes, and strawberries. Large interests are vested along the border of Rumania and the southwest in silk culture and the mulberry tree. Rice is grown to a large extent in the southern part of Siberia and the Caucasus.

In stock raising Russia surpasses any other country of Europe. It has nearly half the horses of the continent and leads all countries in the number of cattle, goats, and sheep. In the num-

ber of swine it is exceeded only by Germany. The animals live in the open air the entire year on the steppes of the southwest, but in the central part they must be sheltered and fed from three to six months. While horses are bred with much care, other domestic animals are not of a high grade. Sheep culture is particularly abundant in the arid regions of the Caspian and Aral seas, where rainfall is insufficient to insure the maturity of crops, but is adequate for the growth of excellent pasturage. Vast interests are vested in raising reindeer in the northern region, while the Tartars along the Caspian and the inhabitants of Turkestan engage extensively in rearing camels.

MANUFACTURES. It may be said that Peter the Great was the founder of the manufacturing industry of Russia, and since his time there has been a steady advance in the number of different products and the quantity produced. A high tariff is imposed by the government to protect home industries. The larger part of the factories are small and the establishments are located rather in rural than in urban districts. However, large plants have sprung up recently in the cities, which have grown rapidly in population on account of the impetus obtained by laborers coming from the country. Textiles rank as the most important products, both in the number of people employed and the value of the product. Next in value are metals, articles of food, lumber, leather, pottery, and paper. Marked attention is given to the manufacture of sugar from beets, but this industry is confined chiefly to the southern part. Silks and embroidery, pipe tobacco and cigars, chemicals, and steel and iron products are made in large quantities. The fisheries yield a large output for canning and curing, while preserved fruits and packed meats are produced in abundance. The larger manufacturing establishments are located in Lodz, Moscow, Saint Petersburg, and Warsaw.

TRANSPORTATION AND COMMERCE. Extensive means for transportation are available, including streams which are navigable for large steamers a distance of 14,250 miles and for small vessels fully 25,500 miles. Canal systems are maintained to unite the Baltic and the White Sea basins, the Baltic and the Caspian basins, and the Baltic and the Black Sea basins. Other navigable waters include the Gulf of Bothnia, the Aral Sea, Lake Baikal, the Sea of Japan, and the Sea of Okhotsk. During a short period in the summer it is possible to navigate the Kara Sea and the Arctic Ocean, but these waters are frozen or dangerous the greater part of the year. About 36,200 miles of railroads are in operation, of which 6,500 miles are in Asiatic Russia. About half of the railroads are owned by the national government and the remainder by provinces and private corporations. The Trans-Siberian Railway, extending from Saint Petersburg to Vladivostok, on the Sea of Japan, is the longest trunk line in the world. Another line extends east-

ward from the Caspian Sea, passing to the western border of the Chinese Empire. However, the railway mileage is less in proportion to area and population than that of other European nations. A considerable mileage of electric lines has been constructed, especially in the larger cities and more populous sections.

The domestic trade has developed without intermission the last two decades, but it has been closely paralleled by that with foreign nations. Germany controls the larger part of both the export and import trade, largely for the reason that Russian business men use the German language very extensively. Other countries that have a considerable share include Great Britain, France, Austria-Hungary, Turkey, China, and the United States. The leading imports include manufactured goods, such as textiles and machinery; articles of food, including tea and coffee; and raw cotton and cotton goods. Cereals, flour, live stock, timber, petroleum, and linseed oil are the principal exports. Owing to an old and well-established custom, a large share of the trade is conducted at great fairs, where live stock, wool, and cereals are dealt in very extensively. The principal fairs are those at Poltava, Moscow, Kharkov, Irbit, and Nizhni-Novgorod. The last mentioned is the largest fair in the empire, but Siberian goods are sold principally at Irbit, in the government at Perm.

GOVERNMENT. Russia had an absolute government until 1905, before which year the country had neither a written constitution nor a representative legislative body. Nicholas II. issued a decree, as a result of the revolution of 1905, granting constitutional government. The chief executive holds office by heredity. He bears the title of Emperor and Autocrat of all the Russias, Czar of Poland, and Grand Prince of Finland. He is limited in his ruling by certain precedents, such as the decree of Emperor Paul, in 1796, concerning the succession to the throne, and that of Peter I., requiring the emperor and princes of the royal blood to be members of the Greek Orthodox Church. Four imperial councils are maintained, including the council of state, which has superintendence of legislation, finance, and civil and church administration; the ruling senate, which has executive and judicial functions; the holy synod, which controls matters ecclesiastical; and the committee of ministers, consisting of twelve ministers, such as of public instruction, of war, of internal affairs, of foreign affairs, etc.

Since 1905 a part of the legislative functions is exercised by the *duma*, or national assembly, which has a membership of about 500. It is the body that represents the people in national legislation and its members are elected by the *zemstvos*, as the assemblies of the districts are called. Bills that are passed by the *duma* and sanctioned by the council of state, or council of the empire, become law when approved by the emperor. The provinces or governments of

Russia are supervised by national police, but each has certain executive and legislative functions. These include the power to manage its municipal, educational, and other general affairs, suffrage being invested for that purpose in the male citizen. Revenues are raised chiefly by issuing trade licenses, by a protective tariff system, and by the control of a large portion of the railway, telegraph, and canal business. The government derives an income from the manufacture of tobacco and sugar, which industries are controlled by it. Internal revenue on spirituous liquors and a tax on land are likewise among the resources.

RELIGION AND EDUCATION. The Greek Orthodox Church is the national church, which has a membership in Russia estimated at 80,300,000, but all sects are granted freedom of religious worship. Other denominations are represented by about 8,250,000 Roman Catholics, 3,225,000 Jews, 3,150,000 Protestants, chiefly Lutherans, 2,650,000 Mohammedans, and 60,000 Armenians. No general system of education has been established, but public schools are maintained in the provinces. Since 1888 the national authorities have been promoting the establishment of common schools, for which purpose grants have been made. Illiteracy is placed at 50 per cent. in the army, which is about the ratio of the people generally. Excellent secondary schools and academies are supported in many of the cities, and twelve noted universities are maintained. Less than half the children of school age receive public training. The nation is divided into fifteen educational districts, all under the direction of the minister of public instruction, and the common schools are supported jointly by local and general taxation. It has many normal and technical schools. A large per cent. of the higher institutions are under the direction of the Holy Synod of the Greek Catholic Church. In 1909 the number of university students was reported at 20,248.

INHABITANTS. Russia has increased rapidly in population the past fifty years, although it has a large number of races. About three-fourths of the inhabitants are true Russians, who constitute a distinct Slavic group of the Caucasian stock. They are divided into Great Russians or Muscovites, Little Russians or Malo-Russians, and White Russians, who number respectively about sixty million, eighteen million, and six million. The population classed as non-Russian includes Germans, Finns, Lapps, Mongols, Jews, Poles, Iranians, Lithuanians, and Tartars. Poland is populated largely by Poles; the Baltic Provinces, by Germans; the north-western part, by Lapps and Finns; the Caucasus, by Iranians and Georgians; Central Siberia, by Kalmucks and Buriat Mongols; the Baltic region, by Letts and by Lithuanians; and parts of Poland and western Russia, by Jews.

Saint Petersburg, the capital and largest city, is situated in the western part, on the Gulf of

Finland. Thirty-five cities have a population of more than 50,000 and twelve exceed 100,000. The chief cities in Russia are Saint Petersburg, Moscow, Warsaw, Odessa, Lodz, Riga, and Kieff, and those in Asia include Baku, Tiflis, and Tashkend. Among the principal ports are Onega, Archangel, Helsingfors, Reval, Cronstadt, Saint Petersburg, Libau, Riga, Odessa, Kertch, Astrakhan, Tanganrod, and Baku. The latest official census gives the total population of the empire at 140,240,679, of which 105,437,895 were in European Russia. Population, 1912, 161,745,450.

LANGUAGE. The Russian language is an important member of the Slavonian family of the Aryan, or Indo-European, tongues and is the successor of the Old Slavic. It was modified remarkably by the Mongolian conquest, in 1224, and by Polish elements being introduced from the West. Modern Russian may be said to date from the time of Peter the Great, but since then many German, Dutch, and French words have been added and the grammatical construction has become modified. The language contains few conjunctions. It is peculiar for the slight grammatical connection between the sentences, but has a remarkable capacity for forming derivatives and compounds. Its alphabet has 37 letters, which form combinations and sounds difficult for foreign students to learn. The language is spoken in its purest and most grammatical form in Great Russia, of which Moscow is the literary and intellectual center. About forty different languages are spoken in the empire. The chief of these, besides Russian, are the German, Lithuanian, Finian, Turanian, and Persian.

LITERATURE. Russian literature may be said to date from the introduction of Christianity by Vladimir in 980. It was in his reign that the first ballads in Russian were written. At that time knowledge began to be disseminated by the monasteries, at which were published numerous treatises on beliefs of the church and a number of historical works. The first writing of note in the Russian is a book of the Gospels that appeared in 1056, but the military contests with the Tartars and Mongols long retarded material literary advancement. In 1560 Makarius published his "Lives of the Saints," the first writing of note after the expulsion of the Mongols and Tartars, and in 1596 appeared Zizania's "Slavic Grammar." Alexei Michailovitch authorized his prime minister to collect Russian laws, which were printed in 1644, and soon after an academy was founded at Moscow. Peter the Great established the Russian language for universal use in public business and communication and founded many schools, among them the famous Saint Petersburg Academy. The writers of the early part of the 18th century were influenced greatly by German and French writers, the most eminent writers of this period being Lomonosov (1711-

1765). Gerhardt F. Müller, a German writer, established the first literary journal at Saint Petersburg, in 1755, and Novikov (1744-1818) published a journal called *The Painter*, through which medium he greatly enlarged the book trade.

Literature became popular in all parts of Russia in the reign of Alexander I., who was a liberal patron of progressive education and greatly increased the number of universities. Since that time other czars have done likewise, and Russian literature in all departments has been enriched by the contributions of native writers as well as by liberal translations from other languages. The most eminent poets of Russia include Alexander Pushkin, Michael Lermontoff, and Baron Delvig; the novelists embrace Feodor Michailovitch, Prince Odojevski, and Count Leo Tolstoi; the dramatists include Nikolaus Polevoi and Nestor Kukolnik; and the historians embrace Michailovoski Danileveski, Vasili Berg, and Professor Pogodin. Russian philosophy was drawn principally from German and English sources, but the country has some eminent writers in jurisprudence and philosophy, the former including Simonof and the latter Sokolof. Among the recent publications are "Russian Officials in Past and Present Times," by E. Karnovich, in 1898; "Emperor Alexander I.," by N. K. Schilder; "Dominion of Muscovite Emperors," by Alexei Michailovitch; and "Russian Books," by S. Vengerov, in 1899. Russia possesses some of the largest libraries in Europe, among which the vast collections of books at Saint Petersburg and Moscow are the most noteworthy.

HISTORY. The early history of Russia is wrapped in myth and tradition. Nothing definite is known prior to the 9th century of the Christian era. No country in the world has so great a variety of nationalities, but the chief one is the Slavonic. It is thought that eastern Slavs were the ancestors of the Russians. They settled on the northern shore of the Black Sea in the early part of the Christian era, but, being harassed continually by neighboring tribes, they invited Rurik, a Scandinavian, to come and reign over them. It appears that he and two brothers established a government in 862, in the vicinity of Kieff. The name *Russes* appears to have originated and came to be applied to them from Norman warriors, who served in the army of the Byzantine emperors, from the circumstance that they passed through the country. Olga succeeded to the government in 945 and in 955 she embraced the Christian religion under the patriarch of Constantinople, but in 957 abdicated in favor of her son, Sviatoslaf. The government passed to Vladimir in 980. In the 35 years of his reign he fully established Christianity as the religion, founded cities and schools, and built a number of canals and other improvements. At that time Kieff rose as a city quite equal in importance to

Constantinople. His reign is counted the heroic effort of Russian history.

Vladimir was succeeded by his sons, who established a number of principalities, making it possible for the Mongols and Tartars to invade the country under Genghis Khan in 1224 and inflict material damage to its prosperity. Soon after the Russian princes became tributary to the Khan, placing Russia in an unfortunate condition, for the reason that its civilization and industries became retarded, while the peoples in the region of Poland, Livonia, and Lithuania made rapid advancement in both. This condition caused the Poles and Teutonic Knights to make invasions from the west, but both Kieff and Novgorod continued to gain in commercial importance and power. Novgorod, being an influential city, was the capital a large part of that period and was an important member of the Hanseatic League. The capital was removed to Moscow in 1328 by Ivan I., whence originated the term *Muscovite*. In 1481 the Tartars were expelled by Ivan III., surnamed The Great, who ruled from 1462 to 1505. He married the niece of the last Byzantine emperor, conquered Novgorod, and otherwise extended Russian dominion. Ivan IV., surnamed *The Terrible*, succeeded to the throne in 1533 and reigned 51 years. His armies were everywhere victorious and, after consolidating Russian territory, he became absolute ruler with the title of *czar*. He began the conquest of Siberia, which was finally annexed to Russia in 1699. The present Czar of Russia descended from the house of Romanoff, which came into power in 1613, and since then the empire has grown continuously in strength and commercial importance.

Alexis Michailovitch succeeded to the Russian throne in 1645, reigning until 1676. His reign was made famous by conquering Little Russia and White Russia from the Poles. In the meantime the Cossacks of Ukraine were compelled to recognize Russian supremacy, but the country was disturbed by contentions because of changes made in the liturgy of the Greek Church. However, Russia's greatness may be said to date from the accession to power of Peter the Great in 1689. His reign of 36 years was at first shared by his half-brother, Ivan, but he soon obtained absolute sway, made Saint Petersburg the new capital, and gave Russia a European rather than a Mongolian tendency. His achievements include the final conquest of Siberia. He annexed Livonia, Ingria, Esthonia, and other territory taken from Sweden by the Peace of Nystadt, in 1721, and constructed canals, encouraged agriculture, and instituted manufacturing and mining. He was succeeded by his widow, Catharine I., in 1725, but she died after a reign of two years and was succeeded by Peter II. The latter was succeeded in 1730 by Queen Anna, the daughter of Ivan, and in her reign the German party became

prominent at court. Nothing of importance may be said to have occurred until the accession of Catharine II., in 1762, who reigned until 1796. Within that period Russia conducted successful wars against Sweden, Turkey, Persia, and Poland. The contests resulted in material extensions toward the east, south, and west. This accession of territory was due chiefly to the three partitions of Poland, in 1772, 1793, and 1795, by which nearly two-thirds of that kingdom became incorporated with Russia, and the annexation of the Crimea in 1783.

Freedom of worship gained a wide foothold under Paul I. (1796-1801), but he greatly retarded the progress of learning by excluding foreign publications and establishing a strict press censorship. In the reign of Alexander I. (1801-1825) many important events tended to enlarge Russian influence. These include the annexation of Finland from Sweden, in 1809; the annexation of Bessarabia from Turkey in 1812; the defeat of Napoleon at Moscow, in 1812; the annexation of part of the Caucasus, in 1813; and the final absorption of Poland, in 1815. Nicholas I. (1825-1855) annexed additional territory from Turkey and Persia and began the Crimean War. Alexander II. (1855-1881) concluded the Crimean War by the Peace of Paris, in 1856, by which Russia lost territory on the north side of the Danube and navigation advantages in the Black Sea, but in 1868 it destroyed every vestige of Polish independence.

In the meantime Russia annexed all of Turkestan, and in 1877 declared war against Turkey. This war was terminated by the Treaty of Berlin, in 1878, by which Russia regained its advantages on the Black Sea and secured Bessarabia. At the same time the Balkan States became organized as governments separate from Turkey. Alexander was assassinated through the influence of Nihilists in 1881 and Alexander III. succeeded him. The important events of his reign include the famine of 1890-91 and the expulsion of many Jews. It witnessed the beginning of the great Trans-Siberian Railroad in 1892. On the death of Alexander, in 1894, he was succeeded by Nicholas II., a young man of 27 years, who soon after married Princess Alix of Hesse. He celebrated his marriage with much pomp and made it the occasion of pardoning 20,000 state prisoners. His reign has been one of remarkable prosperity in commerce and internal improvements. The country became involved in war with Japan in 1904, owing to Russian advances in the Far East, especially in Manchuria. A feeling had become deeply rooted among the common classes of Russians that the nation was invincible. Being defeated in the formidable contest against Japan, the poorer classes rose in a widespread revolution. In the meantime the czar was compelled to grant a constitution and a legislative assembly, known as the *Duma*. In 1914 Russia joined the Entente Allies and at once invaded East Prussia,

but her armies were expelled and defeated, and forces of Austro-Germans penetrated the region eastward beyond Brest-Litovsk. The revolution of 1917 compelled Czar Nicholas II. to abdicate, and the country was governed by Alexander Kerensky and later by Nikoli Lenine. A treaty of peace was signed in 1918, which took Finland, Ukrania, Poland, and the Baltic Provinces from Russia, but it was repudiated and civil war continued to disturb the country.

RUSSIAN REVOLUTION, the movement for political and industrial reform in Russia. This movement may be said to have resulted directly from the disastrous war with Japan, which was not looked upon with favor by a very large part of the Russian people, but the causes may be traced to legislation and conditions dating back several hundred years. Every loss in the war was followed by increased agitation for change, while inefficiency and corruption caused many to lose faith in the czar and the autocratic party. Reformers took advantage of the inability of the government to sustain its sway of absolute reign, and the working classes resorted to strikes with the view of obtaining better wages and improving the conditions of living. Racial and religious riots were frequent, nihilists and anarchists sought to inaugurate a reign of terror, and in many sections the impression prevailed that the empire was on the point of crumbling into pieces. The movement was not concerted, and cannot be said to have begun at any particular time or place. Many were concerned in a line of action for popular liberty, but they did not act in harmony with each other.

The first bold stroke was made July 28, 1904, when Von Plehve, minister of the interior, was assassinated. In November of the same year representatives of the *zemstvos*, meaning the district or provincial assemblies, held a meeting at Saint Petersburg and adopted a memorial asking the czar for a more liberal administration and a representative government. This demand was denied in a ukase of the czar, and, when a body of 100,000 people headed by Father Gapon assembled before the winter palace, Jan. 22, 1905, to present a petition to the czar, they were fired upon by troops and about 2,000 unarmed men, women, and children were killed and about 5,000 were wounded. This massacre had the effect of spreading discontent. Riots followed at Moscow, Odessa, Sebastopol, and in the cities of Poland and the Caucasus. Practically all the educated classes took sides with a movement for liberal reforms and a representative government. In February Duke Sergius, uncle of the czar, was assassinated at Moscow. Peasants rose in revolt, Jews were massacred, much of the railroad traffic and telegraph communication was suspended, a contingent of the army and navy mutinied, and the administration of the government became greatly disorganized. Finally, on Oct. 30, the

czar signed a decree declaring constitutional government.

During the revolutionary movement revolts occurred in the Baltic provinces and Poland, and an organized movement for autonomy occurred in Finland. The Baltic provinces are populated by Germans and Lithuanians, and these people united and established a republic with Rega as its capital. However, the government dispatched 12,000 Cossacks to the revolting provinces and the czar proclaimed an imperial manifesto, announcing local self-government in that section. Like concessions were made to the Poles and in December a manifesto was issued granting autonomy in Finland. An extraordinary diet convened at Helsingfors Dec. 20 to consider proposals for the budget of 1906-07, provisional taxes, and a loan for railway construction; a bill providing by a new fundamental law a parliament for Finland on the basis of universal suffrage with the establishment of the responsibility of the local authorities to the nation's deputies; bills granting liberty of the press, of meeting, and of unions.

The successful termination of the revolution in Russia may be attributed in a large measure to the statesmanship of M. Witte, who served as premier and formed a cabinet pledged to support reformatory measures. The manifesto granting constitutional government is as follows:

We, Nicholas II., by grace of God Emperor and Autocrat of all the Russias, Grand Duke of Finland, etc., declare to all our faithful subjects that the troubles and agitation in our capitals and numerous other places fill our hearts with excessive pain and sorrow.

The happiness of the Russian sovereign is indissolubly bound up with the happiness of our people and the sorrow of our people is the sorrow of the sovereign.

From the present disorders may arise great national disruption. They menace the integrity and unity of our empire.

The supreme duty imposed upon us by our sovereign office requires us to efface ourself and to use all the force and reason at our command to hasten in securing the unity and coördination of the power of the central government and to assure the success of measures for pacification in all circles of public life, which are essential to the well-being of our people.

We, therefore, direct our government to carry out our inflexible will in the following manner:

First—To extend to the population the immutable foundation of civic liberty, based on the real inviolability of person, freedom of conscience, speech, union, and association.

Second—Without suspending the already ordered elections to the state дума, to invite to participation in the дума, so far as the limited time before the convocation of the дума will permit, those classes of the population now completely deprived of electoral rights, leaving the ultimate development of the principle of

the electoral right in general to the newly established legislative order of things.

Third—To establish as an unchangeable rule that no law shall be enforced without the approval of the state duma and that it shall be possible for the elected of the people to exercise real participation in the supervision of the legality of the acts of the authorities appointed by us.

We appeal to all faithful sons of Russia to remember their duty toward the fatherland, to aid in terminating these unprecedented troubles and to apply their forces, in coöperation with us, to the restoration of calm and peace upon our natal soil.

RUSSIAN THISTLE, a plant common to the central part of the United States, found chiefly in the arid region lying between the Mississippi and the Rocky Mountains. Locally it is known as *saltwort* and *tumbleweed*. It thrives best in comparatively dry seasons, has a central stock with many branches, and bears small flowers of a purple color. At maturity the roots loosen and the dry plant is rolled or tumbled by the wind, causing its small seeds to scatter broadcast. In some of the states, especially in South Dakota and Nebraska, it is quite troublesome as a weed in cornfields.

RUSSO-JAPANESE WAR, the armed contest between the military forces of Russia and Japan in 1904-05. War was considered inevitable between the two contending parties several years before activities began. Japan commenced to prepare for the contest as early as 1895, when Russia prevented Japan from acquiring Port Arthur and the Liao-Tung peninsula as a consideration of peace following the Chinese-Japanese War. Subsequently Russia obtained possession of Port Arthur by lease and acquired control of the Chinese Eastern railway. In 1902 it was agreed by Russia that she would evacuate certain ports in Manchuria and aid in reëstablishing Chinese authority in the province as well as to restore the railways to the Chinese. Russia failed to carry out these promises and a sharp diplomatic correspondence between the two nations began in the fall of 1903, Japan insisting upon the evacuation of Manchuria and the establishment of certain Japanese claims in Corea. Diplomatic relations were severed early in 1904 and Japan, without waiting for a formal declaration of war, sent warships and troops to Port Arthur and to Chemulpo in Corea.

The first hostilities occurred Feb. 8, 1904, when the Japanese made a torpedo attack upon the Russian battleships and cruisers lying outside the harbor of Port Arthur. This important place was defended by General Stoessel with an army of 45,000 men and the Russian Asiatic fleet. The Russians had planted submarine mines in the harbor of Port Arthur and the Japanese also placed mines, chiefly in the course necessary to be taken by the Russian vessels

in emerging from the harbor, one of which was struck April 13 by the Russian battleship *Petropavlovsk*, causing a loss of 525 men and officers and including the artist Vereshtchagin and Admiral Makaroff. Besides suffering several sanguinary naval attacks, Port Arthur was besieged by a Japanese army of 100,000 under General Nogi. The fort capitulated Jan. 2, 1905.

Important battles were fought on the Yalu early in May, 1904, where General Kuroki with an army of 54,000 defeated 21,000 Russians under General Sassulitch and compelled a retreat in the direction of Liaoyang. Gradually the Russians were forced to fall back and abandon important strategic points, until the final engagement at Mukden, which began Feb. 24 and continued until March 12, 1905, and in which Marshall Oyama with 450,000 men defeated 410,000 Russians under General Kuropatkin. The Russians had ordered the Baltic fleet to Vladivostock in October, 1904, commanded by Admiral Rojestvensky. This great fleet reached the straits of Corea early in the spring, where it was attacked and completely defeated by the Japanese under Admiral Togo. Soon after this naval engagement steps were taken to agree upon terms of peace. President Roosevelt exercised the friendly offices of the United States and a peace conference was appointed at Portsmouth, N. H., the first session being held Aug. 9. During the war Russia had 870,000 men in the field and Japan had not less than 1,200,000. The Russian losses are given at 312,412 and the Japanese, at 210,000.

The following is a compilation of losses in the principal land battles of both armies:

BATTLE.	RUSSIAN.	JAPANESE.	TOTAL.
Yalu.....	3,210	1,045	4,255
Nanshan.....	3,280	4,250	7,530
Vafangow.....	4,890	1,300	6,190
Liaoyang.....	21,875	18,250	40,125
Sha River.....	67,190	16,328	83,518
Port Arthur.....	15,000	46,500	61,500
Heikoutai.....	12,600	8,940	21,540
Mukden.....	100,000	75,000	175,000

The peace treaty concluding the war was signed at Portsmouth, N. H., Sept. 5, 1905, and was ratified by Russia and Japan in October. In the map the southern half of Saghalien is shown shaded, which portion now belongs to Japan, and Corea is also under Japanese control. Russia has relinquished to China all of Manchuria, which is shown shaded horizontally. The Liao-Tung peninsula, including Dalny and Port Arthur, was transferred to Japan. Following is the full text of the treaty:

The Emperor of Japan on one part and the Emperor of All the Russias on the other part, animated by a desire to restore the blessings of peace to their countries, have resolved to conclude a treaty of peace, and have for this purpose named their plenipotentiaries,—that is to say, for his Majesty the Emperor of Japan, Baron Komura Jutaro Jusami, Grand Cordon of the Imperial Order of the Rising Sun, his

minister of foreign affairs, and his Excellency Takahira Kogoro, Imperial Order of the Sacred Treasure, his minister to the United States, and for his Majesty the Emperor of All the Russias, his Excellency Serge Witte, his secretary of state and president of the Committee of Ministers of the Empire of Russia, and his Excellency Baron Roman Rosen, Master of the Imperial Court of Russia, his majesty's ambassador

interfere with measures for guidance, protection, and control which the imperial government of Japan may find necessary to take in Korea. It is understood that Russian subjects in Korea shall be treated in exactly the same manner as the subjects and citizens of other foreign powers,—that is to say, they shall be placed on the same footing as the subjects and citizens of the most favored nation. It is also agreed,

in order to avoid causes of misunderstanding, that the two high contracting parties will abstain on the Russian-Korean frontier from taking any military measure which may menace the security of Russian or Korean territory.

Article III.—Japan and Russia mutually engage:

First.—To evacuate completely and simultaneously Manchuria, except the territory affected by the lease of the Liao-Tung Peninsula, in conformity with the provisions of the additional Article I, annexed to this treaty, and,

Second.—To restore entirely and completely to the exclusive administration of China all the portions of Manchuria now in occupation or under the control of the Japanese or Russian troops, with the exception of the territory above mentioned.

The imperial government of Russia declare that they have not in Manchuria any territorial advantages or preferential or ex-

clusive concessions in the impairment of Chinese sovereignty not inconsistent with the principle of equal opportunity.

Article IV.—Japan and Russia reciprocally engage not to obstruct any general measures common to all countries which China may take for the development of the commerce or industry of Manchuria.

Article V.—The Imperial Russian Government transfers and assigns to the imperial government of Japan, with the consent of the government of China, the lease of Port Arthur,



SEAT OF THE RUSSO-JAPANESE WAR.

to the United States, who, after having exchanged their full powers, which were found to be in good and due form, have concluded the following articles:

Article I.—There shall henceforth be peace and amity between their Majesties the Emperor of Japan and the Emperor of All the Russias and between their respective states and subjects.

Article II.—The Imperial Russian Government, acknowledging that Japan possesses in Korea paramount political, military, and economical interests, engage neither to obstruct nor

Talien, and the adjacent territory and territorial waters, and all rights, privileges, and concessions connected with or forming part of such lease, and they also transfer and assign to the imperial government of Japan all public works and properties in the territory affected by the above-mentioned lease. The two contracting parties mutually engage to obtain the consent of the Chinese Government mentioned in the foregoing stipulation. The imperial government of Japan on their part undertake that the proprietary rights of Russian subjects in the territory above referred to shall be perfectly respected.

Article VI.—The Imperial Russian Government engage to transfer and assign to the imperial government of Japan without compensation and with the consent of the Chinese Government the railway between Chang-Chung-Fu and Kuan-Chang-Tsu and Port Arthur, and all the branches, together with all the rights, privileges, and properties appertaining thereto in that region, as well as all the coal mines in said region belonging to or worked for the benefit of the railway. The two high contracting parties mutually engage to obtain the consent of the government of China mentioned in the foregoing stipulation.

Article VII.—Japan and Russia engage to exploit their respective railways in Manchuria exclusively for commercial and industrial purposes, and in nowise for strategic purposes. It is understood that this restriction does not apply to the railway in the territory affected by the lease of the Liao-Tung Peninsula.

Article VIII.—The imperial governments of Japan and Russia, with the view to promote and facilitate intercourse and traffic, will, as soon as possible, conclude a separate convention for the regulation of their connecting railway services in Manchuria.

Article IX.—The Imperial Russian Government cede to the imperial government of Japan in perpetuity and full sovereignty the southern portion of the island of Saghalien, and all the islands adjacent thereto, and the public works and properties thereon. The fiftieth degree of north latitude is adopted as the northern boundary of the ceded territory. The exact alignment of such territory shall be determined in accordance with the provisions of the additional Article XI. annexed to this treaty. Japan and Russia mutually agree not to construct in their respective possessions on the island of Saghalien or the adjacent islands, any fortifications or other similar military works. They also respectively engage not to take any military measures which may impede the free navigation of the Strait of La Perouse and the Strait of Tartary.

Article X.—It is reserved to Russian subjects, inhabitant of the territory ceded to Japan, to sell their real property, and retire to their country, but if they prefer to remain in the ceded territory they will be maintained and protected in the full exercise of their industries and

rights of property, on condition of submitting to the Japanese laws and jurisdiction. Japan shall have full liberty to withdraw the right of residence in or to deport from such territory any inhabitants who labor under political or administrative disability. She engages, however, that the proprietary rights of such inhabitants shall be fully respected.

Article XI.—Russia engages to arrange with Japan for granting to Japanese subjects rights of fishery along the coasts of the Russian possessions in the Japan, Okhotsk, and Bering seas. It is agreed that the foregoing engagement shall not affect rights already belonging to Russian or foreign subjects in those regions.

Article XII.—The treaty of commerce and navigation between Japan and Russia having been annulled by the war, the imperial governments of Japan and Russia engage to adopt as a basis for their commercial relations pending the conclusion of a new treaty of commerce and navigation the basis of the treaty which was in force previous to the present war, the system of reciprocal treatment on the footing of the most favored nation, in which are included import and export duties, customs formalities, transit and tonnage dues, and the admission and treatment of agents, subjects, and vessels of one country in the territories of the other.

Article XIII.—So soon as possible after the present treaty comes in force all prisoners of war shall be reciprocally restored. The imperial governments of Japan and Russia shall each appoint a special commissioner to take charge of the prisoners. All prisoners in the hands of one government shall be delivered to and received by the commissioner of the other government or by his duly authorized representative in such convenient numbers and such convenient ports of the delivering state as such delivering state shall notify in advance to the commissioner of the receiving state. The governments of Japan and Russia shall present each other as soon as possible after the delivery of the prisoners is completed with a statement of the direct expenditures respectively incurred by them for the care and maintenance of the prisoners from the date of capture or surrender and up to the time of death or delivery. Russia engages to repay to Japan as soon as possible after the exchange of statement as above provided the difference between the actual amount so expended by Japan and the actual amount similarly disbursed by Russia.

Article XIV.—The present treaty shall be ratified by their Majesties the Emperor of Japan and the Emperor of All the Russias. Such ratification shall be with as little delay as possible, and in any case no later than fifty days from the date of the signature of the treaty, to be announced to the imperial governments of Japan and Russia respectively through the French minister at Tokio and the ambassador of the United States at Saint Petersburg, and

from the date of the later of such announcements this treaty shall in all its parts come into full force. The formal exchange of ratifications shall take place at Washington as soon as possible.

Article XV.—The present treaty shall be signed in duplicate in both the English and French languages. The texts are in absolute conformity, but in case of a discrepancy in the interpretation the French text shall prevail upon the details of the evacuation in conformity with the above principles, and shall take by common accord the measures necessary to carry out the evacuation as soon as possible, and in any case no later than the period of eighteen months.

Sub-Article to Article IX.—So soon as possible after the present treaty comes into force a commission of delimitation composed of an equal number of members is to be appointed, respectively, by the two high contracting parties, which shall on the spot mark in a permanent manner the exact boundary between the Japanese and Russian possessions on the island of Saghalien. The commission shall be bound so far as topographical considerations permit to follow the fiftieth parallel of north latitude as the boundary line, and in case any deflections from that line at any points are found to be necessary compensation will be made by correlative deflections at other points. It shall also be the duty of said commission to prepare a list and a description of the adjacent islands included in the cession, and, finally, the commission shall prepare and sign maps showing the boundaries of the ceded territory. The work of the commission shall be subject to the approval of the high contracting parties.

In conformity with the provisions of Articles III. and IX. of the treaty of peace between Japan and Russia of this date, the undersigned plenipotentiaries have concluded the following additional articles:

Sub-Article to Article III.—The imperial governments of Japan and Russia mutually engage to commence the withdrawal of their military forces from the territory of Manchuria simultaneously and immediately after the treaty of peace comes into operation, and within a period of eighteen months after that date the armies of the two countries shall be completely withdrawn from Manchuria, except from the leased territory of the Liao-Tung Peninsula. The forces of the two countries occupying the front positions shall first be withdrawn.

The high contracting parties reserve to themselves the right to maintain guards to protect their respective railway lines in Manchuria. The number of such guards shall not exceed fifteen per kilometer, and within that maximum number the commanders of the Japanese and Russian armies shall by common accord fix the number of such guards to be employed as small as possible, while having in view the actual requirements.

The commanders of the Japanese and Russian forces in Manchuria shall agree upon the details of the evacuation in conformity with the above

principles, and shall take by common accord the measures necessary to carry out the evacuation so soon as possible, and in any case no later than the period of eighteen months.

RUSSO-TURKESTAN, or **Russian Turk-estan**, a large region of Central Asia, comprising the western section of what is generally known as Turkestan. The area is about 411,500 square miles. It is included in the semi-arid belt of the continent. Chains of mountains extend through the southern part, where the country has an Alpine-like aspect, but the western and northern parts are comparatively flat and sandy. Large stretches of desert make up the northern part, but oases and fertile valleys intersperse many of the ridges in the interior. The climate is continental, with dry and hot summers and cold winters. Stock raising is the principal industry. Large interests are vested in agriculture, but irrigation is depended on to a large extent. Rice, wheat, oats, millet, fruit, and vegetables are grown in abundance. The domestic animals consist chiefly of sheep, camels, horses, and goats. Rugs, carpets, clothing, and implements are the principal manufactures. The trade is largely with Russia and is carried principally by caravans and the Trans-Caspian Railroad. Taskand and Namangan are noted as trading centers. See **Turkestan**.

RUSSO-TURKISH WAR, a conflict between Russia and Turkey, due to a movement on the part of Russia to secure an extension of territory to the Mediterranean. Atrocities committed in Bulgaria and other Balkan states caused Russia to declare war against the Ottoman Empire in April, 1877. A treaty had been concluded between the former country and Rumania, in which Russia was made the protector of the Christians in the Balkan Peninsula. A Russian army crossed the Danube at Galatz the latter part of June and another force crossed into Bulgaria about the same time at Simnitza. The Turks under Osman Pasha had taken a strong position at Plevna, which was attacked by the Russians under General Krüdiner, but the latter were driven back with great slaughter. Suleiman Pasha defeated a Russian army under General Gerko, who was advancing upon Adrianople, and Mehemet Ali operated on the Lom River against Crown Prince Alexander.

The center of interest was lodged at Plevna, where Osman Pasha was defeated in an attempt to escape and was compelled to surrender. Several decisive engagements took place later at the Shipka Pass, near Philippopolis, and in Armenia. The Russians began to march upon Constantinople in January, 1878, which compelled the Turks to agree to an armistice. The two nations concluded the Treaty of San Stefano, by which Russia gained large advantages. This caused several nations to fear that an extension of Muscovite power would give Russia precedence, hence the Congress of Berlin was assembled to revise the treaty and

undertake to settle the Eastern Question. See **Berlin, Congress of**.

RUST, a disease that affects cereals and many species of grasses. It is due to several parasitic fungi, whose growth is favored by excessive summer heat, by fields illy ventilated, and by excessively rich manures. Wheat rust is probably the best known. It has a complex life history, consisting at first of small fungi of one cell, but later passing through various stages and merging into a form of colored dust. Wheat rust is red or black, that infesting the tobacco plant is brown, and the fungous growth attacking plants of the mustard family is white.

RUST, the coating caused by oxidation on iron and steel, especially under exposure to air and moisture. The term is applied in an extended sense to a film or oxide formed on any metal by corrosion. Bright iron does not rust in an atmosphere which is comparatively dry, but, when it has once formed on the surface, it continues to deepen rapidly, for the reason that condensation of the liquid contained in the air takes effect more easily on a rust-covered surface than on bright metal. Steel and cast iron are less easily affected by rust than wrought iron, because the latter is nearly pure iron and contains less carbon. The surface may be protected against rusting by japanning and galvanizing, or by coating it with plumbago, oil paint, or zinc. Farmers find it profitable to coat the bright surface of their plows and other implements with varnish, oil, or paint as soon as the season is over to prevent them from rusting. Rust may be removed from the surface by rubbing with an oiled rag or emery paper.

RUTH, Book of, a book of the Old Testament, which is generally placed immediately after the Book of Judges. It gives an account of Ruth, a Moabitess, who was married to Chilion, son of the Hebrews Elimelech and Naomi. After the death of Elimelech and Chilion, Ruth accompanied Naomi to Bethlehem, where she went into the field as a gleaner, but later married her kinsman, the aged Boaz. She became the mother of Obed, and through him the great-grandmother of David and the ancestress of Jesus Christ. The Book of Ruth is canonical and comprises a beautiful idyllic composition.

RUTHENIANS (rū-thě'nī-ānz), or **Russniaks**, the name of a Slavic people who inhabit large parts of Galicia, Bukowina, and Hungary. This race of people is allied to the Russians in language and physical features. They are mostly peasants, belong to the Orthodox Greek Church, and are pro-Russian in sympathies. As a political force they have been a disturbing element in Austria-Hungary, where they number about 3,500,000, of whom about 300,000 are in Bukowina and 400,000 in Hungary. These people are sometimes called *Red Russians* and *Little Russians*.

RUTHERFORD (rūth'ēr-fērd), a borough

of New Jersey, in Bergen County, eight miles northwest of Jersey City. It is between the Passaic and the Hackensack rivers, on the Erie Railway, and is the residence of many New York business men. The manufactures include clothing, mirrors, cotton and linen goods, and machinery. Electric lighting, sewerage, and a public library are maintained. Population, 1905, 5,218; in 1920, 9,497.

RUTLAND (rūt'land), a city in Vermont, county seat of Rutland County, sixty miles south of Burlington, on the Burlington and Rutland, the Delaware and Hudson, and other railroads. It is finely located on Otter Creek, near Killington Peak of the Green Mountains, and has a large trade in produce and merchandise. The noteworthy buildings include the county courthouse, the public library, the house of correction, the Memorial Hall, the opera house, the high school, and the Federal building. It has systems of waterworks and sanitary sewerage, brick and macadam pavements, and electric street railways. Among the manufactures are sugar evaporators, scales, lumber products, monuments, dairy supplies, buttons, hardware, and machinery. The vicinity was settled in 1770. Rutland was one of the State capitals from 1784 to 1804. Population, 1920, 14,954.

RUTLEDGE (rūt'lěj), **Edward**, statesman, born at Charleston, S. C., Nov. 23, 1749; died Jan. 23, 1800. He studied law at London, England, where he was called to the bar, and began a successful practice at Charleston in 1773. The following year he was elected to the First Continental Congress and two years later was a signer of the Declaration of Independence. In 1780 he was taken prisoner while commanding at the siege of Charleston and was detained at Saint Augustine for eleven months. He was elected to the United States Senate in 1794, where he was an influential worker, and four years later became Governor of South Carolina.

RUTLEDGE, John, brother of Edward Rutledge, born at Charleston, S. C., in 1739; died July 23, 1800. He studied law at London, England, and began the practice of that profession at Charleston in 1761. Four years later he took part in the Stamp Act congress at New York and was a member of Continental Congress from 1774 to 1775. He took part in drawing up the State constitution, was President of the State of South Carolina, and afterward served as Governor under the new constitution. During the Revolutionary War he was active in the field, serving under Greene until 1782. Soon after he was elected to Congress, where he opposed the abolition of the slave trade, and in 1789 became a justice of the Supreme Court. Washington appointed him chief justice of the Supreme Court in 1795, but he lost his reason and the Senate refused to confirm the appointment.

RUYSDAEL (rois'däl), **Jacob**, eminent

landscape painter, born in Haarlem, Holland, about 1625; died there March 14, 1682. He first studied and practiced surgery, but later gave his entire time to painting, his earliest works of art bearing date in 1645. His paintings are remarkable for the precision with which objects from nature, such as foliage, animals, and floating clouds, are outlined. He is the originator of a style of composition and a remarkable plan for grouping trees and shrubs. Seven of his etchings are extant, but the number of paintings still in galleries is larger, several being in Berlin, Paris, and London.

RUYTER (rī'tēr), **Michael Andriaenszoon**, eminent admiral, born in Flushing, Holland, March 24, 1607; died April 29, 1676. He descended from a family in moderate circumstances and entered the naval service as cabin boy when only eleven years of age. Careful attention to the duties of a seaman caused him to be promoted a captain in 1635, and he was made rear admiral in 1645. He served in the East Indies for some years, fought against the pirates off the northern coast of Algeria in 1647, and in 1652 commanded a squadron in the war against England. In 1653 he defeated Blake off Dover, and in 1666 commanded in conjunction with Van Tromp against the British fleet under Prince Rupert and the Duke of Albemarle, but the battle was not decisive. The following year he destroyed several English vessels on the Medway, and inflicted material damage at Rochester and Gravesend. When the war against Holland broke out, in 1671, he commanded against the allied fleet of France and England, but the results were indecisive. He was sent against the French in the Mediterranean in 1675, where he fought a desperate battle off the coast of Sicily, but died from the result of a wound. Ruyter ranks with the most eminent military men of Europe. His name has been commemorated by a splendid military monument at Amsterdam.

RYAN, Patrick John, Roman Catholic archbishop, born in Cloneyharp, Ireland, Feb. 20, 1831. After studying in Thurles and Dublin, he entered Carlow College, and was ordained deacon in 1853. He removed to Saint Louis, Mo., the same year, where he studied at Carondelet Seminary, and was made priest in 1854. Faithful and efficient service caused his promotion to the position of coadjutor archbishop of Saint Louis in 1872, and he was made archbishop of Philadelphia in 1884. In 1887 he went to Rome in the interest of a university at Washington. He published "What Catholics do Not Believe" and "The Causes of Modern Religious Skepticism." He died Feb. 11, 1911.

RYE, an important cereal plant. It is native to the Levant, but is cultivated extensively in temperate climates, especially in Western Europe. Rye is nearly allied to wheat, but its nutritive qualities are less, being about as 64 to 71. It is hardier than wheat and is adapted to

poorer and lighter soils. In most sections of North America it may be pastured in the early stages of its growth, but this is not advisable in dry regions. It does not grow as far north as barley, but yields well in sections that are too cold for wheat. In most cases it is sown in the fall and ripens early in the summer, somewhat earlier than wheat. The species are not numerous. Those cultivated most extensively are known as *spring* and *winter* rye, depending whether they are sown in the spring or in autumn.

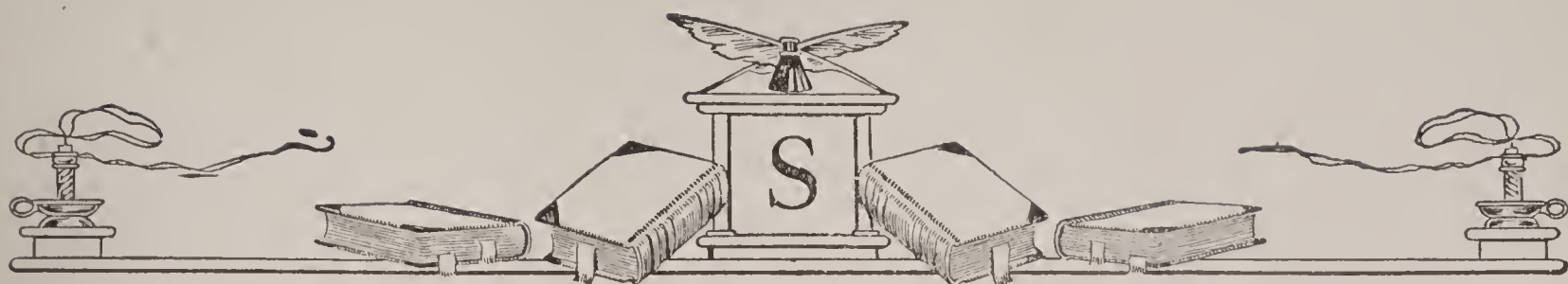


RYE.

Rye forms the bread-stuff of a large number of people, especially in Russia, Germany, Holland, Sweden, Norway, and Great Britain. It is used extensively in making whisky, especially *Hollands*, and the straw is valuable for stuffing mattresses and collars and for use in making brick, baskets, and hats. Both winter and spring rye is grown in the United States, where the annual production is 26,500,000 bushels. New York, Pennsylvania, Wisconsin, Iowa, Illinois, Missouri, Michigan, Minnesota, New Jersey and Kansas are among the leading rye-producing states. Ontario produces more than half of the rye grown in Canada, having an annual yield of about 1,250,000 bushels.

RYE-HOUSE PLOT, a conspiracy planned in England in 1683, by the Whig party, with the view of assassinating Charles II. and the Duke of York, afterwards James II. The scheme was to be executed near a farm called Rye-house as the two returned from the Newmarket races, but they passed the vicinity of the intended attack earlier than was expected, thus frustrating the scheme. Soon after the plot was discovered and Lords Essex, William Russell, Algernon Sidney, and others were placed under arrest. The first mentioned committed suicide in the Tower and both Russell and Sidney were beheaded, though neither of the three were in any way connected with the plot. However, Lieutenant Colonel Walcot, one of the real contrivers of the plot, was apprehended and brought to the block for treason.

RYSWICK (rīz'wīk), or **Rijswijk**, a village of Holland, two miles southeast of The Hague. It is celebrated from the peace of Ryswick, which was concluded here on Sept. 20, 1697. This treaty ended the war waged by the allied armies of Germany, Holland, Spain, and England against Louis XIV. of France on account of the claim of the latter to the French throne, which was recognized by the treaty. France, Spain, Holland, and England signed the treaty on Sept. 20, and Germany sanctioned it on Oct. 30.



S

SABINE

S, the fifteenth consonant and nineteenth letter of the English alphabet, forming a sibilant and representing a hissing sound. The letter is derived from the original Indo-Germanic, but came to us from the Latin through the Greek *sigma*. It is made by placing the front of the tongue against the roof of the mouth above the front teeth, an opening being left just behind the tip, and then emitting the vocalized breath. S has two sounds, known as *sharp* or *hard*, and *soft* or *sonant*. The former is represented in *this*, *thus*, *sin* and the latter represents the sound of *z*, as in *muse*, *music*, *wise*. It is silent in some words, as in *viscount*, *aisle*, and *island*.

SAALE (zä'le), a river of Germany, which rises in the Fichtelgebirge, in Bavaria, and flows into the Elbe above Magdeburg. The length is 226 miles. It is navigable for 103 miles, having been improved by dredging and the construction of several locks.

SAAR (zär), a river in the southern part of Germany, rising in the Vosges Mountains, near the boundary of Alsace. It flows northwest through Lorraine and the Rhine Province, discharging into the Moselle a short distance above Treves. The Saar is 152 miles long. It is navigable to Saarbrücken, a distance of 54 miles. A portion of the Saar valley (in Germany) was given to France by the Paris Peace Congress, in 1919, conditional on a plebiscite.

SAARBRÜCKEN (zär-brük'en), a city of Germany, in the Prussian Rhine Province, on the Saar River, 48 miles northeast of Metz. It is surrounded by a coal-mining region. The features include an old castle, the city hall, the gymnasium, electric street railways, and a statue of Bismarck. Among the manufactures are leather, hardware, tin, Berlin blue, tapestry, machinery, and linen fabrics. The municipality has extensive systems of waterworks and sanitary sewerage. Saarbrücken was made a part of Prussia in 1815. It was captured by the French in 1870, but they were compelled to abandon it after a few days. Population, 1915, 26,944.

SABBATH (säb'bath), the seventh day of the week, appointed by the Mosaic law for cessation from labor and the worship of God. It was set apart to commemorate the event that

God created the world in six days and rested on the seventh. Keeping holy the Sabbath is enjoined by the Fourth Commandment in Exodus, because of God's having rested after the creation, and in Deuteronomy its observance is demanded because of the deliverance of the Hebrews from Egyptian bondage. Any mention of the Sabbath in the New Testament implies the seventh day of the week, but the Christian fathers in general drew a distinction between the Sabbath and the Sunday as early as the first three centuries. They regarded the Jewish Sabbath as obsolete and looked upon Sunday as the divinely instituted Lord's Day, joyous in its character, making memorable the resurrection of Christ. The Council of Laodicea, in 366, made it plain that Christians are to observe Sunday.

The name *Sabbath* is used by most Christians to designate the Lord's day, or Sunday, though Jewish writings and those of Adventists and other Christian sects making use of the name imply that Saturday, or the Sabbath, is meant. The Sabbath was observed with great rigidity in the time of Christ. At that time Jews were not allowed to go from their city a distance greater than 2,000 cubits, about a mile, which came to be called a *Sabbath-day's journey*. Thus, every seventh day was one of rest, while every seventh year was known as the *Sabbatical year*, in which the lands were not cultivated and the crops and fruits produced became the property of all in common. When the Pharisees denounced Christ as a Sabbath breaker because he rendered service to mankind, he replied: "The Sabbath was made for man, and not man for the Sabbath: therefore the Son of Man is Lord also of the Sabbath."

SABINE (sä-bēn'), a river of the United States, which rises in northeastern Texas and, after a course of 500 miles toward the southeast and south, flows into the Gulf of Mexico. It enters the gulf through Sabine Pass, a bay about eighteen miles long and eight miles wide. The Sabine River forms the principal part of the boundary between Texas and Louisiana. It is a shallow stream and is navigable only for small vessels.

SABINES (sā'bīnz), or **Sabini**, a people of ancient Italy, who occupied a large part of northeastern and middle Italy. Amiternum was their capital and occupied a place near the present town of Aquila. The Sabines were closely allied to the Latins. They were an important nation before Rome was founded and it is thought that they occupied the Quirinal Hill, while Romulus built Rome on the Palatine Hill. The Sabines ceased to exist as an independent nation in 290 B. C., when the Romans incorporated them as a part of Rome. History contains many evidences that the population of Rome included an important Sabine element and that its influences became intermixed with those of Latin origin, both in religious rites and civil institutions. No remains of the Sabine language in the form of inscriptions have been discovered, but coins issued in Rome at an early period give evidence that the Sabine language had a notable influence upon that of the Romans.

SABLE, a flesh-eating mammal of the weasel family. It is about the size of the pine marten, to which it is closely related. The color is brownish in summer, but turns much darker in winter, in which condition the fur is highly esteemed as an article of commerce. The value of a single skin ranges from \$25 to \$75, depending on the fineness and color. In summer the skin is less valuable, owing to the fact that it is characterized more or less with white spots on the head and grayish markings on the neck. The sable is native to the northern part of Europe and Asia. It lives principally in trees, hunting by night and lying concealed during the day. The *pakan* of North America is frequently called the *Hudson Bay sable* and its skin is sometimes used to imitate that of the true *Russian sable*.

SABLE ISLAND, an island in the Atlantic, situated 110 miles east of Nova Scotia. It has a low and sandy surface, is about 25 miles long, and has a breadth of one to five miles. The island is under the government of Nova Scotia. It has two lighthouses and a hospital for shipwrecked persons. Many disastrous accidents at sea occur in the vicinity. Valuable fisheries prevail. Vegetation consists chiefly of grasses, peas, potatoes, strawberries, and cranberries.

SAC, or **Sauk**. See **Sacs and Foxes**.

SACCHARIN (săk'kā-rīn), a white crystalline compound derived from coal tar. It was discovered at Johns Hopkins University by Ira Remsen and Charles Fahlberg in 1879. Saccharin is soluble in hot water, ether, and alcohol, and melts at 220°. It is 300 times sweeter than cane sugar, one grain being perceptible in 10,000 grains of distilled water. Manufacturers of confectionery use it to a considerable extent, especially in Germany, and it is also employed in brewing. It is recommended in some diseases, as diabetes, though it is not considered a food. The name *saccharin* in an extended sense is

applied to any substance having the quality of sugar, such as honey, cane sugar, glucose, and other saccharin compounds.

SACHS (zäks), **Hans**, noted poet, born in Nuremberg, Germany, Nov. 5, 1494; died Jan. 19, 1576. He learned the trade of a cobbler and spent the usual number of years in journeyman wandering, or *Wanderjahre*. In the meantime he was instructed in singing by a Meistersinger named Lienhart Nunenbeck. Much of his poetic work was done at Munich. His writings include about 6,000 poems, but only about one-fourth are extant. Those in print comprise 53 sacred plays, 59 fables, and 64 farces. Many of his hymns were used extensively in promoting the spiritual feeling in the Reformation. A collection of his works was published in 1872. Two years later a monument was erected to his memory in Nuremberg.

SACKETT'S HARBOR (săk'ets), a village of New York, in Jefferson County, on Black River Bay, eight miles east of Lake Ontario. It is situated at the mouth of the Black River, has a good natural harbor, and is a port of entry. Communication is furnished by steamers and by the New York Central Railroad. The features include the Federal military post, the Madison Barracks, the high school, and Fort Topkins Park. In the War of 1812 it was important as a port and for the building of the frigates *Superior* and *Madison*. The British made two attacks upon the place, but they were defeated with a loss of 150 men. Population, 1905, 1,398; in 1920, 1,094.

SACKVILLE, Thomas, statesman and author, born at Buckhurst, England, in 1536; died April 19, 1608. He studied law at the Inner Temple and was called to the bar. Soon after he joined Thomas Norton in writing the tragedy "Ferrex and Porrex," which was afterward called "Gorbobuc." This was the first English tragedy to be written in blank verse and was performed at the Inner Temple on Twelfth Night. In 1566 he was made Lord Buckhurst and soon after went to France as a minister. He became Lord Treasurer of England in 1599. James I. created him Earl of Dorset. Sackville sat as a member of the court that tried Mary, Queen of Scots, and presided at the trial of the Earl of Essex. He was buried in Westminster Abbey.

SACO (să'kō), a river of New England, which rises in the White Mountains of New Hampshire and flows toward the southeast through Maine. The main branch passes through the noted Crawford Notch of the White Mountains. A number of falls and cataracts in its course afford valuable water power. The falls include one of 42 feet at Saco and one of 72 feet at Hiram. The entire length is 160 miles, but it is navigable only to Saco, which is the head of tide water and of navigation by large vessels.

SACO, a city of Maine, in York County, on

the Saco River, twenty miles southwest of Portland, on the Boston and Maine Railroad. The river is crossed within the city by four bridges and supplies water power for industrial purposes. The noteworthy features include the Dyer Library, the Thornton Academy, the York Institute Library, the high school, and Pepperel Park. Among the manufactures are cotton and woolen goods, boots and shoes, lumber products, and machinery. Old Orchard Beach is a popular summer resort, about three miles from Saco. Saco was settled in 1631 and was first incorporated as Pepperelboro, but was chartered under its present name in 1867. Population, 1900, 6,122; in 1920, 6,817.

SACRAMENT (săk'ra-mənt), the name of certain religious rites in the Christian Church. The term was used by the early writers to denote any mysterious thing or doctrine, but later it became restricted to particular rites, which are believed by some churches to impart to Christians who use them an invisible grace. The Greek, the Armenian, and the Roman Catholic churches hold to the seven sacraments of baptism, confirmation, the eucharist, penance, extreme unction, orders, and marriage. Protestants generally believe only in two sacraments, those of baptism and the Lord's supper, on the ground that the New Testament mentions only these two as having been instituted by Christ. Luther and Melancthon accepted these and inclined toward adding penance as a sacrament. While the Friends reject the doctrine of the sacraments, the Mennonites and Dunkers coördinate washing of the feet as an obligatory ordinance, which they administer with baptism and the Lord's supper.

SACRAMENTO (săk-rä-mən'tō), the largest river in California, which has its source in the northeastern part of the State, where it is called the Pitt River for some distance. The general upper course is toward the southwest, but at Redding it assumes a southerly course. After receiving from the east the Feather River and joining the San Joaquin, it flows into the Pacific Ocean through San Pablo and San Francisco bays. The entire length is 600 miles, including the Pitt River, and about one-half is navigable for small boats, but steamers of large size ascend as far as Sacramento, about 50 miles.

SACRAMENTO, the capital of California, county seat of Sacramento County, 90 miles northeast of San Francisco. It is finely located on the Sacramento River, which is spanned by a bridge, and has transportation facilities by the Southern Pacific and the Central Pacific railways. The streets are regularly platted, crossing each other at right angles, and many of them are paved and lighted with gas and electricity. In the central part of the city is a fine public park, which contains the State capitol, completed in 1869 at a cost of \$2,500,000. Within the park are beautiful flower beds, spa-

cious walks, and many rare species of shrubs and trees. Other buildings of note include the county courthouse, the post office, the city hall, the Crocker Art Gallery, and several fine bank and office buildings.

Sacramento has a well-organized system of public schools. It is the seat of the Howe's Academy, the Saint Joseph's Academy, and the Christian Brothers' College. The public library contains 30,500 volumes, while the State library has 113,500 volumes. Among the benevolent and charitable institutions are the Protestant Orphan Asylum, the Southern Pacific Hospital, the Marguerite Home for Aged Women, and the City Dispensary. The Roman Catholic cathedral is a fine ecclesiastical structure. Fairs are held annually under the State Agricultural Society, which maintains fine grounds and buildings. It has extensive systems of sanitary sewerage and public waterworks.

The city is located in a fertile farming and fruit-growing region, hence has a large trade in produce and merchandise. The manufactures include flour, saddlery, spirituous liquors, furniture, carriages and wagons, and machinery. The shops of the Southern Pacific Railway employ a large number of workmen and machinists. Communication within the city and to many interurban points is facilitated by electric railways.

The first settlement was made in 1839, when Captain J. A. Sutter built a small fort and named it New Helvetia. Miners and prospectors began to reach the place in 1848, when the name was changed to Sacramento. Floods caused much damage in 1850 and in 1853, but levees have been constructed and the land has been raised to avert such dangers. In 1854 it became the State capital and it was chartered as a city in 1863. Its rapid growth dates from 1854, when the first railroad was completed into the city. Population, 1900, 29,282; in 1920, 65,857.

SACRIFICE (săk'rī-fīz), an offering to God, either as a thanksgiving or an atonement. The practice of offering sacrifices has prevailed from remote antiquity and it is not certain how it originated. Some writers contend that it was instituted by God, while others think that it originated in the desire of man to approach the Deity. Some classes look upon sacrifices as a compensation to the gods, hence they contend that their efficacy depends more or less upon the value of the offering, or upon the exertion required by the individual to attain and offer the sacrifice. The offering of a thing of value, as gold or silver, was not looked upon as being of greater efficacy than a blood offering, such as a slaughtered animal, since the latter represented both value and human exertion.

Peace offerings consisted usually of one or more animals, certain parts of which were burnt upon the altar, while the remainder was given to the priest to be eaten by him and his family. Others consisted of those known as *sin offerings*,

which included sacrifices of various kinds for the remittance of sins. Among the Jews it was customary to offer the Passover lamb in memory of the deliverance from Egypt. The book of *Leviticus* details the custom of offering sacrifices among the Hebrews. However, this practice extended to the Greeks, Romans, Brahmans, Mexicans, and practically to all primitive and ancient peoples. In many countries it was customary to offer human sacrifices, but in most instances the blood sacrifices were confined to the offer of animals.

SACS AND FOXES, the names of two tribes of American Indians which are closely associated in history. They are of the Algonquin family. The Sacs settled near Green Bay, Wis., on account of being pressed westward by the Iroquois, where they were joined subsequently by the Foxes. Both tribes were courageous as warriors and were noted as enemies of the French. They assisted the English in most of their wars. In 1712 they made an attack upon Detroit, but were compelled to retreat to Lake Saint Clair, where they met defeat. Later they served under Pontiac and during the Revolution supported the English. The Rock River Sacs aided Great Britain in 1812 and the Foxes aided the English in attacking Sandusky.

The Sacs ceded their land in 1816 and became wholly identified with the Foxes, who ceded lands in 1824 and in 1830. In 1832 they fought under Blackhawk to recover a part of their lands, but gave up more of their territory in a treaty with General Scott at the close of the Blackhawk War. Later they removed to central Iowa, and in 1842 most of them were removed to the Osage Reservation, now Oklahoma. A party of 325 Sacs and Foxes purchased land at Tama, Iowa, in 1857, which they still occupy and manage with marked industry and intelligence. Settlements of Sacs and Foxes are also in Kansas, Nebraska, and Oklahoma. The two tribes number about 1,000, many of whom are among the most industrious and successful of their race.

SADDLERY (săd'dlēr-ŷ), the general name applied to saddles and harnesses, such as are offered for sale in a saddler's shop. Saddles were in common use among the Egyptians, but they were a part of the draught harness of the animal that bore the load, instead of being a seat upon the back for the rider. The ancients used a form of saddle or box for the back of the camel, which served both for riding and to contain merchandise and other commodities. Saddles were first padded, but trees came into use in Rome about the 4th century A. D., and stirrups began to be used in the 7th century. Sidesaddles date from the 12th century and are used largely by women.

Both saddles and harnesses have differed very materially under a variety of circumstances and in different countries. Among the principal parts of a saddle are the *tree*, the *seat*, the *pom-*

mel, the *skirts*, the *stirrups*, and the *girth*. Among the essentials of a modern harness are the *bridle*, either with or without blinders; the *collar*, which fits about the neck and shoulders; the *hames*, which fit to the collar; the *tugs*, forming the attachment between the hames and the load; and the *saddle*, which holds the lines, tugs, and reins in place. Harnesses are either single or double, depending whether they are to be used for a single horse or a team.

SADDUCEES (săd'ŭ-sēz), the name of one of the chief Jewish parties or sects, the other being the *Pharisees*. They rose among the Jews in the 2d century before Christ, taking their name from Zadok, a priest who declared in favor of Solomon. It is certain that they did not become a party as early as the time of Zadok, but it is thought that the early representatives were his descendants. All of them admired his fidelity to the theocratic government and, like all other Jews, admitted that the Mosaic law was given at Sinai by Jehovah in person. The Sadducees rejected the belief that an oral law of Moses had come from God, and would accept nothing beyond the written word, hence they came to hold three particular doctrines.

The principal doctrines of the Sadducees include the belief that all the law of God was given in a written form to Moses, that there is no resurrection of the dead with attendant rewards and punishments in the future world, and that there are neither angels nor spirits. Less numerous than the Pharisees, they included the more wealthy and aristocratic, and at one time almost monopolized the more honored places in the priesthood and the highest dignities. There was a marked decrease in their number in the 1st century, but a revival of their views took place later, and their position is now represented by the Karaites. Most of the information regarding the Sadducees is drawn from Josephus and the New Testament.

SADI (să-dē'), the name assumed by Sheikh Muslih-ud-din, a celebrated didactic poet of Persia, born at Shiraz about 1184; died there in 1263. He descended from Ali, son-in-law of Mohammed, but little is known of his early history. After studying science and theology at Bagdad, he made a pilgrimage to Mecca, and soon after traveled extensively in Palestine, Syria, Hindustan, Egypt, and Eastern Europe. The Crusaders made him a prisoner and required him to work as a slave on the Tripolitan fortifications, but he was recognized by an Aleppo merchant, who ransomed him. Fully fifty years of his life were spent in traveling, in the course of which he made fourteen pilgrimages to Mecca, but in the later part of his life he settled in his native town. Sadi not only delighted the people of his time by his writings in prose and verse, but with numerous sage precepts, which he was able to give in many different languages. His "Gulistān," or "Garden of Flowers," is

counted his best writing, being a work in prose and verse that comprises anecdotes, stories, and numerous observations and reflections on morality. "Bustan," or "Tree Garden," is a collection of fables and histories, and "Pand-Nameh," or "Book of Instructions," is an elegant treatise on the duty of culture. It contains many maxims.

SADOWA (sä'dō-vä), a village in Bohemia, on the Bistritz River, near Königgrätz. It is important as the scene of a decisive battle on July 3, 1866, in the Austro-Prussian War. The Austrian army of 220,000 was commanded by General Benedek and the Prussian of 240,000, by King William I. The terrific battle raged from 8 A. M. to 4 P. M., resulting in the defeat of the Austrians with a loss of 21,000 men and 22,000 prisoners, while the Prussians lost only 9,000. This battle is sometimes called Königgrätz, since the village of Sadowa is about eight miles distant.

SAFE, an iron or iron and steel receptacle for protecting valuables against burglars and fire. Documents and possessions of value were protected in ancient times by placing them in iron-bound oaken chests and in the charter rooms of old mansions, but these have given way to fire- and burglar-proof safes of modern construction. The first patent on a fireproof safe was issued in 1801. Subsequently they were greatly improved, both in size and in the style of manufacture, and they are now in almost universal use among business men and others in civilized countries. Safes are commonly made with double-plated sides, the space between being filled with a nonconductor of heat, such as fire clay and chalk, or plaster of Paris and alum. Some manufacturers pack a number of small tubes filled with an alkaline solution in the space between the two parts, these being hermetically sealed, and in case the safe becomes overheated the tubes burst and aid in saving the contents by saturating them.

To be of service for all purposes, a safe must be heavy enough to be proof against being carried away, while the lock and the material used in its construction must contain the elements necessary to prevent burglars from forcing an entrance to secure the contents. The most secure safes have keyless time locks, which are so constructed that the owner may set a mechanical contrivance in the form of a clock, thereby making it impossible to open the safe at any other time than that intended by the person setting the time lock. Electrical arrangements are provided in some cases to give signals in case there is an unlawful interference, and these are attached to the safes in such a manner that they may not be easily seen by intruders. Experience has demonstrated that it is much easier to render a safe fireproof than to make it proof against burglars. Safes are made of any size to meet the needs of those wanting small or large accommodations in the way of space to receive deposits.

Safe-deposit companies are corporations that receive and keep money, stocks, jewelry, bullion, and other valuable property for depositors. This is an American enterprise, the first company being chartered in New York in 1861, but now there are safe-deposit companies in all the large cities of the world. These companies provide strong, fireproof vaults, which they construct of steel and iron plates welded together, and surround them with strong masonry, thus making them absolutely proof against thieves and fire. Tiers of safes and deposit boxes of all sizes are placed in the interior, making it possible to accommodate patrons with the size and kind of storeroom wanted. The vaults are guarded by armed watchmen both day and night, and a careful record is kept of each depositor. A person renting a safe or box is described minutely in a record book. He receives a private password and is supplied with the only key or keys that fit the lock of the box or safe rented, each being supplied with a different lock. Safe-deposit companies have been the means of saving many thousand dollars' worth of valuable papers and property in cases of fire, and in supplying protection for the valuables of residents and travelers.

SAFETY LAMP, a device for giving light in mines. It is constructed so the flame does not cause an explosion in cases where fire damp prevails. Marsh gas is often freed in many coal mines by cutting into seams and, when mixed with a quantity of air, it assumes a highly explosive form. Besides the danger incident to the explosion, there is further danger from choke damp after the explosion has occurred, for the reason that an explosion always renders a large bulk of air unfit to support life. Sir Humphry Davy, in 1816, invented the first safety lamp, but it has been materially improved upon within recent years. The Davy lamp depends upon the principle that flame does not pass through fine network of wire or gauze and that light does. It is constructed of a cistern to hold the oil, and the wick, issuing from a tube at the top, is covered and fully surrounded by wire gauze. The wires are usually not over one-fiftieth of an inch in diameter, and the apertures must not exceed one-twenty-second of a square inch. When constructed on that plan, the air passes through the apertures, even when charged with fire damp.

An improvement on the Davy lamp consists of a glass cylinder placed inside the wire gauze, thereby guarding against air currents and insuring a more uniform light. There is a perceptible increase in the size of the flame when the lighted lamp comes in contact with the atmosphere mixed with fire damp, and the miner is thereby warned that danger is at hand. Reasonable safety is insured as long as the lamp is in good condition, but it has been found that it is not an absolute protection against danger. The newer safety lamps are self-extinguishing when

brought into an explosive mixture of air and fire damp. However, the most secure devices of this kind yet devised are the miners' lamps which employ electricity.

SAFETY VALVE, a valve, usually circular in form, which is used on steam boilers to furnish protection against taxing them beyond their strength. Such a valve is kept in place either by a spring or by a weight, and is located at the side or in the top of a steam boiler. Most stationary engines have one valve of this kind, while locomotives are supplied with two. The valve is gauged at a certain point, depending upon the strength of the boiler or the pressure desired, and the steam escapes whenever the pressure exceeds the weight with which the valve is held. After the valve has been forced upward and the pressure on the boiler is relieved, it assumes its former place. The standard for determining the size of the safety valve is the grate surface, which should not exceed two square feet of surface in the boiler to one square inch in the safety valve. Care should be exercised so the valve is not fastened or loaded too heavily as compared to the strength of the boiler.

SAFFLOWER (săf'flou-ēr), an annual plant of the *Compositae* family. It has an erect cylindrical stem from one to two feet high, spiny leaves, and compact heads of flowers of a deep orange color. The stem is inclined to branch considerably. It is native to India, but has been naturalized in Egypt and the southern part of Europe, where it is cultivated extensively. The safflower is used principally as a dye and for making rouge. The seed yields an oil used extensively by the Asiatics as a laxative in medicine and as a lamp oil. Dyes obtained from this plant are derived from the leaves, which are picked by hand in dry weather and dried in a kiln. Both red and yellow coloring materials are obtained, but they are not valued highly for dyeing. However, the safflower is of economic value in making rouge, which receives its color from the coloring properties of this plant.

SAFFRON (săf'frūn), an autumn flowering species of crocus. It is often called the *autumnal crocus* to distinguish it from a species called spring crocus, which it closely resembles. The flowers of the plant yield the saffron of the market, which is now used largely for coloring confectionery, liquors, medicine, and foodstuffs. It requires about 4,000 flowers to make an ounce of saffron. Formerly saffron was used as a dye material, for perfume, and as a medicine, but it has gone out of use for those purposes, except in parts of Asia. The saffron plant is cultivated extensively for its flowers in France, Spain, Italy, and the western part of Asia.

SAGA (să'gà), meaning *a tale*, the name used to designate a form of literature common to the ancient Scandinavians, particularly those of Iceland. The sagas include many volumes of writings that date from the 12th and the

three following centuries. They embrace history, poetry, legends, and writings that blend fiction with authentic narratives. Prior to the 12th century they passed from generation to generation without being committed to writing, hence the mythical and fabulous circumstances connected with many of them are accounted for. The word has the same meaning as the German



1. SAFFLOWER. 2. SAFFRON.

word *Sage*, and German writers have applied the term to the legendary and traditional literature of their own and other countries. Thus, the *Firthjofs-Saga* is attributed to the Norsemen, the *Ingvars-Saga* to the Swedes, the *Eymunds-Saga* to the Russians, and the *Knytlinga-Saga* to the Danes.

SAGASTA (sà-gäs'tà), **Praxedes Mateo**, statesman, born at Torrecilla de Cameros, Spain, July 21, 1827; died Jan. 5, 1903. He was educated at the School of Engineers in Madrid and in 1854 became a member of the constituent Cortes, but took part in the insurrection of 1856 and was obliged to flee to France. A general amnesty proclaimed soon after permitted him to return to Spain, when he became professor of the School of Engineers in Madrid and edited *La Iberia*, the principal organ of the progressist party. In 1866 he took part in another insurrection and fled to France, and did not return until the death of Queen Isabella. He avowed his belief in a monarchical government for Spain in 1870, became minister of state the same year, and was successively minister of the interior, president of the council, and minister of foreign affairs. In 1875 he became the leader of the liberal party. He caused the Castillo ministry to be overthrown in 1881 and was made prime minister. He was succeeded in the ministry by José Posado Herrera in 1883, but again became minister after the death of King Alfonso XII. In 1890 he retired, but was chosen minister in 1893, serving until 1895. The steady decline of Spanish influence in Cuba and the Philippines caused him to be called by the queen regent to form a new cabinet, serving as prime minister throughout the Spanish-American War. When

the Treaty of Paris, that required Spain to give up its principal colonies, was submitted to the Cortes for ratification, Senor Sagasta and his cabinet supported its ratification, but a resignation followed on account of a majority of only two votes being polled against a counter measure. Sagasta was one of the leading statesmen in the recent history of Spain.

SAGE, an extensive genus of plants of the mint family, which are widely distributed in warm regions, embracing 450 species. Most of these plants are perennials of a shrubby nature. They have greenish gray leaves, yield bluish flowers, and grow to a height of about two feet. The *garden sage*, native to the southeastern part of Europe, is the best known. It is used extensively for flavoring meat, especially for dressing in poultry, and the leaves are employed in making a slightly stimulating tea. The *apple-bearing sage* is native to Crete, where the gallnuts are used in flavoring confectionery.

SAGE, Russell, capitalist, born in Oneida County, New York, Aug. 4, 1816; died July 22, 1906. After attending the public schools, he en-



RUSSELL SAGE.

gaged in business at Troy, but later removed to New York City, where he acquired a fortune by investing in railroad stocks. He promoted various telegraph and cable companies, and was an investor in the elevated railroad of New York City. In 1853 he was elected to Congress as a Whig and was reelected in

1855. An attempt was made to assassinate him in 1891 by means of a dynamite bomb, but he escaped uninjured, while W. R. Laidlaw, one of his clerks, received severe injury. The latter sued him for damages in 1895 and was awarded \$40,000. His vast estate was left to his wife, Margaret Slocum Sage, at the time of his death. The latter became famous as one of the most noted philanthropists of America. She established the Sage Foundation of \$10,000,000, in 1907, to improve the social and living conditions in the United States. Subsequently she made liberal gifts to the Pascal Institute, Berea College, Princeton University, and other institutions.

SAGE GROUSE, the name of a species of grouse native to North America, so named from its habit of feeding upon the sagebrush. The legs and feet are feathered to the toes, the tail is elongated, and the feathers have a brownish-yellow color. The male is larger than the female and has naked air sacs on each side of the neck. An average cock is about 30 inches long, while the hen ranges from 20 to 24 inches in length. The flesh is highly esteemed as food, but it is frequently tainted by a bitter flavor from

the sagebrush, especially if the bird is not drawn as soon as shot. The sage grouse is found on the plains from British America to the northern part of Mexico, but is most abundant in the sagebrush region.

SAGHALIEN (sä-kä-lyën'), or **Sakhalin**, an island off the eastern coast of Asia, located north of Yezo and separated from the mainland by the Gulf of Tartary. It lies in the Sea of Okhotsk and between it and Yezo is the Strait of Perouse. In the northern part is the Gulf of Amur; east of it, the Bay of Patience; and south of it, the Gulf of Aniva. It is 670 miles long and from 15 to 80 miles wide. The area is 27,500 square miles. The surface is mountainous, with elevation ranging from 3,500 to 5,000 feet, but the coasts are generally fertile. Owing to its extent from north to south, it has a considerable difference in climate. Cold currents from the Sea of Okhotsk affect it noticeably, hence the eastern coast is somewhat colder than the western, which is influenced by the warm currents of the Sea of Japan. The winters are very severe, but the summers are warm. A snowfall of seven feet during the winter is not uncommon and rains are correspondingly abundant.

Saghalien has valuable forests, consisting chiefly of coniferous trees. Fishing is an important occupation, both in the streams and off the coast. Agriculture, coal mining, and lumbering are the principal occupations. The inhabitants consist largely of Ainu stock, but a considerable number are Russian. Fishing is largely in the hands of the Japanese and Chinese. The island was discovered in the 17th century by Gerrit de Bries, a Dutch navigator. It was claimed by Russia as a part of Siberia and became a Russian penal colony in 1869. However, Japan claimed the southern part of the island until 1875, when it was released in exchange for a part of the Kurile Islands. By the Treaty of Portsmouth, which terminated the Russo-Japanese War, in 1905, the southern half was ceded to Japan. The total population of the island is 29,875.

SAGINAW (säg'ī-nā), a city in Michigan, county seat of Saginaw County, on the Saginaw River, 98 miles northwest of Detroit. It is on the Grand Trunk, the Père Marquette, and the Michigan Central railroads. The largest vessels that ply on the lake are able to reach the harbor. Four railroad and five public bridges span the river. The area of the city is about fifteen square miles. It has brick and asphalt pavements, electric street railways, public waterworks, and Hoyt and Riverside parks. The noteworthy buildings include the county courthouse, the Hoyt Library, the Germania Institute, the Federal post office, the Arbiter Hall, the Masonic Temple, the Saint Mary's Hospital, the Saint Vincent's Orphan Home, and the Saginaw Valley Medical College.

Saginaw is important as an industrial and

wholesaling center. Among the manufactures are lumber products, flour, furniture, sailing vessels, salt, tobacco products, engines, and machinery. In the vicinity are extensive deposits of salt and bituminous coal, large quantities of which are mined. The town was platted in 1836 and the first charter was granted in 1831. Formerly there were two cities, known as Saginaw and East Saginaw, but they were united by an act of the Legislature in 1890. Population, 1904, 46,610; in 1920, 61,903.

SAGINAW BAY, an inlet from Lake Huron into the State of Michigan, forming the largest and most important bay of the Southern Peninsula. It is sixty miles long and thirty miles wide. Saginaw Bay has several fine harbors and valuable fisheries. It receives the water from the Saginaw River, a stream formed by the Shiawassee and Flint rivers. The Saginaw River is 30 miles long and is navigable for 24 miles by steamers drawing ten feet of water. Its principal tributaries are the Chippewa and Cass rivers.

SAGITTARIUS (săj-īt-tā'rī-ūs), the sign of the zodiac into which the sun enters about Nov. 22. It is so named from the archer and is the ninth of the twelve zodiacal signs. The name is also applied to a constellation, the *Sagittarius*, which corresponds to the sign Capricornus.

SAGO (sā'gō), an article of food obtained from the inner portion of the bark of several species of palm trees. The sago-bearing palms



SAGO PALM AND FRUIT.

thrive in the East and West Indies, the Bahamas, and New Guinea. They attain a height of from 20 to 35 feet and a diameter of about 20 inches. The trees are cut down at maturity to secure the medullary or inner part, which weighs from 150 to 700 pounds. It is reduced to powder and by a process of treatment is formed into grains about the size of coriander seeds, or is ground into a whitish powder called *sago meal*. The principal constituents are protein, 9 per cent.; water, 12 per cent.; and nitrogen-free extract (mostly starch), 78 per cent. In the countries where sago is produced it is used ex-

tensively as a staple food. Elsewhere it is eaten mainly as a delicate article of diet. It is also employed as a starch for textile fabrics, in adulterating arrowroot, and as an essential ingredient for making soluble cocoas.

SAGUENAY (săg-ē-nā'), a river of Canada, in the province of Quebec. It is the outlet of Lake Saint John, but has its source mainly in the Chamouchouan River and other streams that rise 150 miles northwest of the lake. Below the lake it has a length of 130 miles, flowing into the Saint Lawrence about 115 miles below Quebec. Many rapids are in the upper course and a large part is characterized by fine scenery and precipitous cliffs. The town of Tadousac, at the mouth, is noted as a summer resort. It is navigable to Ha Ha Bay for the largest steamers.

SAGUNTUM, or *Saguntus*, anciently an important city of Spain, near the Ebro, on the Canales River, three miles from the Mediterranean. The city was founded by Greek traders, under whose influence it rose to wealth and commercial importance, but is noted in history more particularly for the siege and battle fought here by the Carthaginians under Hannibal in 219 B.C. The siege extended over a period of about one year against an army of 150,000 men. After being sorely pressed by a famine, the city made a most heroic effort to repel the besieging army, but its army was utterly routed and the city was destroyed. This battle was the direct cause of the Second Punic War. The site of Saguntum is now occupied by the town of Murviedro. Near it are the remains of a theater and the ruins of a temple of Bacchus.

SAHARA (sā-hā'rā), the extensive desert of North Africa, embracing the largest unproductive region in the world. It may be said to extend east and west from the Atlantic to the Nile, and from the interior of the Sudan northward to the interior of Tripoli, Algeria, and Morocco, but there are deserts of more or less extent penetrating from it in various directions. The entire area included in the desert is estimated at 3,565,565 square miles, or a region nearly as large as all of Europe. Its surface is constituted of formations differing vastly in composition, and ranges in altitude from 100 feet below to 8,000 feet above sea level. It may be said to comprise a vast undulating expanse, being formed mainly of ranges of hills, dry water courses, evaporated lake beds, extensive sand tracts, and here and there oases bearing a variety of vegetable forms. In the northern part are ranges of mountains extending southward from the chains of the Atlas in Morocco and Algeria, where also are the tracts known as the Gidi and Areg deserts. The most extensive tracts of level surface are in the interior and southern parts, where the sand often drifts very much like snow in a storm, with the difference that it is much more unpleasant and sometimes extremely dangerous. A large part of Egypt

and Abyssinia are included in the Libyan desert, which extends westward beyond 20° east of Greenwich.

It was formerly supposed that the Sahara lies almost exclusively below the level of the sea, and that interior Africa could be redeemed for cultivation by conducting the water from the ocean through a vast canal to supply a water surface sufficient for the formation of clouds that would distribute rain in abundance. This view has been disposed of by recent explorations, but it is reasonably certain that low-lying districts between Morocco and the Senegal River, now belonging to Spain, could be redeemed by admitting water from the Atlantic. Many species of wild animals are abundant in the Sahara, among them the hyena, antelope, mountain sheep, baboon, tortoise, ostrich, lion, and many others, all of which find an abundance of material for subsistence in the oases or on the desert tracts producing at least scant supplies of vegetation. Serpents, jerboas, lizards, and allied forms of life are quite common in the regions of burning sands, where a variety of herbage prevails that subsists with little moisture. In the region of great heat and moving sands, as the Gidi Desert, extending through the expanse south of Morocco nearly parallel to the Atlas Mountains, the most characteristic features of the desert are found, such as total absence of water and vegetation, and the presence of intense heat and strong wind.

The Sahara Desert is crossed and traversed exclusively by caravans, though railroads have been built across short expanses projecting from the desert proper, particularly in the Nile basin and Algeria, and the French have projected a line to run through the regions tributary to the Upper Senegal and Niger rivers. An advantage is found in traveling from oasis to oasis in caravans, because an organized company can better supply itself with the necessary means of subsistence, such as water and food, for long journeys. Besides, these organized companies have greater assurance of overcoming the danger attending the hot winds, or simooms, and attacks by hostile natives. Many of the oases are well watered and, by reason of great fertility, support a considerable trade and, in many cases, one or more towns. The moisture common to oases comes largely from springs and subterranean water courses, but in southern Algeria and elsewhere the productive area has been greatly enlarged by artesian wells, the depth ranging from 10 to 400 feet.

It is estimated that the Sahara has a population of about 2,500,000, which is made up largely of Berbers, Arabs, and Negroes. The inhabitants subsist mainly by the cultivation of cereals and fruits and the rearing of camels and sheep. In some regions they conduct a considerable trade with the caravans that move periodically through the different sections. The most important caravan routes extend from the northern

part of the Sudan to the Nile and the seaports of the Mediterranean. Valuable mineral deposits are abundant, especially salt, which is derived largely from the vicinity of Lake Kaffra. Deposits of granite, iron, limestone, and many metals are abundant, but these are practically undeveloped. Salt is produced quite extensively and is transported to ports on the Mediterranean, or is conveyed by caravans and the Niger River to the Atlantic ports.

SAIGON (sī-gōn'), or **Saigon**, the capital of French Cochin China, on the Saigon River, near where the stream enters the South China Sea. It is one of the most important river ports of Southern Asia. Saigon has convenient railroad facilities and canal connections with Mekong. It has a large interior trade in cereals and fruits. A vast commerce is maintained with China and the East Indies, principally in rice. Among the manufactures are earthenware, sailing vessels, clothing, lumber products, tobacco and cigars, textiles, and machinery. It is strongly fortified and contains a number of important government buildings, hospitals, temples, and educational institutions. Since 1862 it has belonged to France. Population, 1917, 62,526.

SAIL, a class of canvas cloth used to attach to a mast or stay on a vessel. The purpose is to aid in propelling or moving the vessel in the water. Many kinds of material are employed in making sailcloth, but flax and hemp are used most generally. Cotton, jute, linen, and various vegetable fibers are utilized in making certain kinds of sails. Several breadths of canvas are necessary to construct a single sail. They are securely sewed together by a double seam, and a bolt rope is fastened around the edge by means of a strong cord.

The size of the sail depends upon the vessel, since the larger forms require a greater propelling force to move them in the water, hence the size and strength of the sail is proportional to the size of the ship or boat on which it is to be used. It is possible to secure the greatest propelling power when the wind is right astern, but advantage may be gained when it is on either beam by dividing the sail into two parts, the one part acting to cause the vessel to move sideways, and the other having a tendency to propel it forward. Various other combinations are taken advantage of in placing the sails, which make it possible to gain a forward movement with a fairly unfavorable wind, though under such conditions it becomes necessary to have the vessel move in a zigzag course.

The two principal types are square sails and fore-and-aft sails. *Square sails* are four-sided. They are bent to a yard and are normally at right angles to the keel. *Fore-and-aft sails* are attached to a boom, gaff, or stay, and are normally nearly parallel to the keel. The upper edge of a sail is called the *head*; the lower edge, the *foot*; and the sides in most sails are known as *leeches*. The lower corners of a square sail

are its *clews*, and the same name is applied to the lower after corner of a fore-and-aft sail. A *tack* is the lower forward corner of a fore-and-aft sail, or the lower weather corner of a square sail, and the *earing* is the upper corner of the latter kind. Sailmaking was an important industry among the ancients and still continues to hold an important place among the industries, although steam is now employed largely in navigation.

SAINT ALBANS (al'banz), a city in Vermont, county seat of Franklin County, 25 miles northeast of Burlington, on the Vermont Central Railroad. The site is two miles from Lake Champlain, on an elevation of 400 feet, within sight of the Green and the Adirondack mountains. The surrounding country is fertile, producing cereals, fruits, and vegetables. Marble quarries are worked in the vicinity. The chief buildings include the county courthouse, the public library, the Villa Barlow Convent, the public hospital, and the Warner Home for the Destitute. Among the industries are a creamery, cheese factories, bridge works, railroad shops, and iron works. It has an extensive trade in cheese, butter, and marble products. Saint Albans was platted as a village in 1859 and incorporated as a city in 1897. Population, 1900, 6,239; in 1920, 7,522.

SAINT ALBANS, a city of England, in Hertfordshire, about twenty miles northwest of London. It has convenient railroad connections with London and other cities. Among the manufactures are silk and other textiles, earthenware, and machinery. It has a number of machine shops and iron foundries. Saint Albans is noted particularly for the Benedictine Abbey founded here by King Offa of Mercia in 795, in which Cardinal Wolsey served as abbot. The city contains a monument to Lord Bacon and the tomb of Sir John Mandeville, a famous traveler. Two battles were fought at Saint Albans in the War of the Roses, in 1455 and 1461. Population, 1918, 17,286.

SAINT ANDREWS, a town of Scotland, in Fifeshire, 35 miles northeast of Edinburgh. It is a seaport of the North Sea, has railroad facilities, and contains the celebrated University of Saint Andrews. This institution was founded in 1411 and is the oldest university in Scotland. In connection with it are a museum, a botanical garden, and a library of 116,000 volumes. Saint Andrews has a fine cathedral, numerous other churches, and a considerable trade. Population, 1918, 8,682.

SAINT AUGUSTINE (ə-gŭs-tĕn'), a city in Florida, county seat of Saint John County, Florida, near the Atlantic coast, 35 miles southeast of Jacksonville. It is on the Saint Augustine and South Beach and the Florida East Coast railroads. The site is on the shore of Matanzas Bay and is beautified by semitropical vegetation. Among the features are the sea wall constructed by the Federal government, the

Alicia Hospital, the customhouse and post office, the public library, and the ruins of Fort San Marco, now Fort Marion. It has manufactures of tobacco products, utensils, and machinery.

Saint Augustine is the oldest city in the United States. It was founded in 1565, when the Spaniards under Menéndez established it as a center of influence and built a fort here. The streets are narrow in some parts of the city, but within recent years many improvements have been made, and it has become noted as a popular winter watering place. Many remains from the early period of its history have been preserved, including the Ponce de León and the Alcazar hotels, and the former residence of the Spanish governor, now used for the post office. The surrounding country is dotted with orchards of orange and lemon trees and the climate is remarkably equable and healthful. Population, 1900, 4,272; in 1920, 6,192.

SAINT BERNARD DOG (bĕr'nārd), the largest domestic dog, so named from the hospice of Saint Bernard, where this breed of dogs has been maintained through many centuries. Two species are marked by distinct characteristics, one having smooth and the other rough hair. The former are considered of greater power, but representatives of both breeds stand about thirty inches high and weigh 150 pounds. These dogs are muscular, stand erect, and have a massive skull and an intelligent expression. The coat of hair is very dense, the feet are broad and powerful, and the nostrils are somewhat dilated. In color they differ materially, but it is usually black or black and white spotted. These dogs are kept in large numbers in the Alpine passes to rescue travelers who are lost in snowstorms, or aid those belated at night. In some cases they are sent ahead of parties to test the safety of ice bridges or trace indistinct or snow-covered roads, which they are able to do through the keenness of the sense of smell.

SAINT BERNARD PASS, the name generally applied to two passes of the Alps. They are distinguished from each other by the names Great Saint Bernard and Little Saint Bernard. *Great Saint Bernard* is on the east side of Mont Blanc, in the Pennine Alps, between the Canton of Valais, Switzerland, and the department of Piedmont, Italy. It is 8,125 feet high and near its highest part is the famous hospice founded by Saint Bernard de Menthon, in 962, as a refuge of safety for those crossing the Alps. The pass is covered with snow nine months of the year, and the monks of the hospice keep a number of Saint Bernard and Newfoundland dogs to aid in rescuing those in danger or distress from cold. Among the famous armies that traversed this pass were that of the Romans, that of Charlemagne, that of Frederick Barbarossa, and that of Napoleon when invading Italy in 1800. *Little Saint Bernard* is south of Mont Blanc, crossing the Grecian Alps from the Isère valley, in France, to the Dora Baltea valley, in Italy.

It is 7,175 feet high. Near its summit is a hospice, founded by Saint Bernard de Menthon.

SAINT BONIFACE, a city of Provencher County, Manitoba, on the Red River, opposite Winnipeg, and on the Canadian Pacific and other railroads. It has gas and electric plants, brick yards, and flour and rolling mills. The chief buildings include Saint Boniface College, federal building and courthouse, and Roman Catholic Cathedral. It is connected by several bridges with Winnipeg. Population, 1919, 12,225.

SAINT CATHARINES (kâth'â-rînz), a city in Ontario, capital of Lincoln County, 12 miles northwest of Niagara Falls, on the Grand Trunk and other railroads. It is on the Welland Canal and is noted for its marine hospital and artesian mineral wells. Among the buildings are the courthouse, high school, and public library. The manufactures include cotton and woolen goods, flour, and machinery. It is a port of entry. Population, 1921, 19,881.

SAINT CHARLES, a city in Missouri, county seat of Saint Charles County, on the Missouri river, 22 miles northwest of Saint Louis. It is on the Wabash and the Missouri, Kansas and Texas railroads. A splendid railroad bridge 6,535 feet long crosses the river at Saint Charles. The noteworthy buildings include the county courthouse, the Daniel Charles Military College, the Sacred Heart Academy, and the Lindenwood Female College. Among the manufactures are flour, tobacco, cotton and woolen goods, dairy products, and earthenware. The public utilities include pavements, sanitary sewerage, and public waterworks. It was settled in 1769 and was the State capital from 1821 to 1826. Population, 1900, 7,982; in 1920, 8,503.

SAINT CHRISTOPHER: See **Christopher, Saint**.

SAINT CLAIR, a river and lake of North America, which form a part of the boundary between the State of Michigan and the Province of Ontario. The Saint Clair River flows from Lake Huron into Lake Saint Clair. It is about forty miles long and half a mile wide, and is of vast importance in the navigation of the Great Lakes. A railroad tunnel under it extends from Port Huron, Mich., to Sarnia, Ontario, and has a length of 11,550 feet. Lake Saint Clair receives the water from the Saint Clair and Thames rivers, and its surplusage flows through the Detroit River into Lake Erie. It is 30 miles long, is about 25 miles wide, and has an area of 360 square miles. Within it are several islands and it has excellent fisheries. The surface is 575 feet above sea level.

SAINT CLOUD, a city in Minnesota, county seat of Stearns County, sixty miles northwest of Saint Paul, on the Mississippi River. It is on the Great Northern and the Northern Pacific railroads, has an abundance of water power, and is surrounded by a farming and stock-raising region. The chief buildings include the county courthouse, the public library, the State

normal school, the State reformatory, the Saint Raphael's Hospital, and the Home for the Aged. The manufactures include lumber products, flour, wagons, farming implements, and machinery. A fine quality of granite is quarried in the vicinity. It was settled in 1859 and incorporated in 1868. Population, 1905, 9,422, in 1920, 15,873.

SAINT CLOUD, a town of France, on the Seine River, six miles west of Paris. It was long noted for the celebrated palace of Saint Cloud, which was used as a summer residence by Napoleon I., Louis XVIII., Charles X., Louis Philippe, and Napoleon III. The palace was destroyed in the siege of Paris in 1870, but the park in which it stood is still one of the finest in the vicinity of Paris. Population, 1918, 6,892.

SAINT CROIX (kroi), a river of North America, forming a part of the boundary between Maine and New Brunswick. It issues from Schoodic or Grand Lake and, after a course of 75 miles toward the southeast, flows into Passamaquoddy Bay. Steamboats ascend to Saint Stephen, a distance of twenty miles. It is sometimes called the Schoodic, or the Passamaquoddy, River.—Saint Croix, a river of Wisconsin. It rises near the southwestern part of Lake Superior, has a southerly course, and flows into the Mississippi 35 miles below Saint Paul. The length is about 200 miles. It has a number of fine falls and forms part of the boundary between Wisconsin and Minnesota.

SAINT CYR (săn sêr), a town in France, two miles west of Versailles, with which it is connected by railway. Louis XIV. founded a school for girls at Saint Cyr, at which Racine's "Ester" and "Athalie" were written expressly for the pupils. The school was suppressed by the Revolution, but Napoleon founded the famous military school at Saint Cyr on its site in 1806, and near it are two of the advance forts of the new enceinte around Paris. Population, 1918, 4,468.

SAINT-CYR, Laurent Gouvain, Marshal of France, born in Toul, France, April 13, 1764; died March 10, 1830. He studied the fine arts, but in 1782 enlisted to serve on the frontier. Soon after he rose to the rank of general of division, commanded a department of the army on the Rhine, and in 1798 was sent to Rome as commander of the army in Italy. Later he joined Moreau in Germany, where he defeated Kray at Biberach, and in 1801 became ambassador to Spain. The following year he commanded the French army in southern Italy, was sent to Catalonia in 1808, and soon after resigned his position. However, he was recalled to the service in 1811, when he took charge of a corps for the invasion of Russia, where he won a noted victory at Polopzk, for which he was made a marshal. In 1813 he was compelled to capitulate at Dresden. He supported the Bourbons and became minister of war under Talleyrand. In 1824 he retired from public life.

SAINT DENIS (săn dē-nê'), a city of

France, four miles north of Paris, with which it is connected by railway and rapid transit. It is strongly fortified, has canal connections with the inner harbor of Paris, and contains numerous buildings of historic interest. The famous Abbey of Saint Denis was completed under Philip the Bold and was long the burying place of French kings. Louis XII. caused mausoleums to be built with figures of the princes buried here and monuments were added by all the monarchs up to Henry II. Napoleon founded a school for daughters of the members of the Legion of Honor in the monastery, which still flourishes, and Louis XVIII. improved the museums and added numerous monuments. Saint Denis is at present one of the most beautiful and scenic cities of France. It has many fine buildings and gardens. The principal manufactures include leather, flour, sailing vessels, railway cars, engines, chemicals, textile fabrics, and machinery. The city was so named from the abbey founded by Dagobert on the burial place of Saint Denis, the apostle of Paris. Population, 1916, 64,790.

SAINTE-BEUVE (sǎnt-běv'), **Charles Augustin**, eminent literary critic, born at Bolognes-sur-Mer, France, in 1804; died Oct. 13, 1869. He was born shortly after the death of his father and his early education devolved upon his mother, who gave him the best training possible under adverse circumstances. He entered the College Charlemagne at Paris in 1818 and, after studying medicine for some years, took up a literary course. In 1840 he became keeper of the Mazarin Library, a position that made it possible for him to devote himself studiously to literary criticism and to writing contributions for the *Constitutionnel*. His most important writings include a review of Victor Hugo's "Odes and Ballads" and the 28 volumes embraced in his "Monday Talks." The latter comprises the contributions published in the *Constitutionnel* on Mondays.

SAINT ELIAS (ě-lī'as), **Mount**, an elevated mountain of North America, situated near the boundary between Alaska and British America, elevated 18,100 feet above sea level. It was long thought that Saint Elias is the highest mountain peak of North America, but Mount McKinley is now so regarded, its peak towering 20,464 feet above sea level. Great glaciers move from its perpetually snow-covered sides, and have worn great precipices and chasms in their course to the Pacific. It is an important landmark, for the reason that it is completely isolated from other great peaks. The foothills have forests up to a height of 2,000 feet, but the mountain itself is barren.

SAINT ÉTIENNE (sǎn-tō-tyě'n'), a city of France, in the department of Loire, of which it is the capital. It is situated on the Furens, a tributary of the Loire, about thirty miles southwest of Lyons. The city has railroad connections with other trade emporiums. Many of the

streets are well graded and improved with electric lighting, stone and macadam pavements, waterworks, and rapid transit. The churches of Saint Étienne and Notre Dame are noted structures. It has a school of fine arts, several industrial schools, a museum, and a well-organized public school system. The importance of the place as a manufacturing center is due to the water power drawn from the Furens River. Among the products are firearms, cutlery, Bessemer steel, engines, railway cars, earthenware, and machinery. The ribbon trade is counted the largest in the world and it gives employment to 45,000 weavers. It has a growing export trade in merchandise, coal, and clothing. Population, 1921, 148,656.

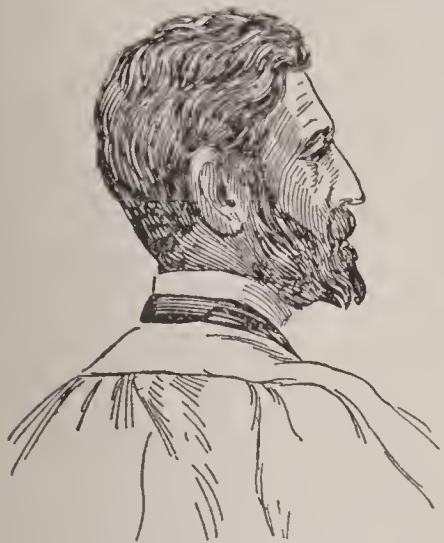
S A I N T-ÉVREMOND (sǎn-tā-vr'-môn'), **Seigneur de**, eminent author, born in Saint Denis, France, April 1, 1613; died Sept. 29, 1703. He descended from a noble family of Normandy and, after studying under the Jesuits, entered the military service, taking part in the battles of Freiburg, Rocroi, and Nordlingen. Later he engaged in literary work, but a witty essay on a treaty made between Normandy and England required him to seek safety in flight to Holland and later to England, spending the later years of his life in London. He was a personal friend of Charles II. and other distinguished men of England. Many of his essays, comedies, and letters are counted among the masterpieces of the latter part of the 17th century, all showing much wit and elegant style. An edition of his collected works was published in 1804.

SAINT FRANCIS (sǎnt frǎn'sis), the name of two rivers in North America, one in the United States and the other in Canada. The former rises in southeastern Missouri, has a general course of 450 miles toward the south, and flows into the Mississippi near Helena, Ark. It forms a part of the boundary between Missouri and Arkansas and is navigable for 150 miles. In several places it expands into long lakes, thought to be due to sinking of the soil as a result of the earthquake in 1811. The Saint Francis River of Canada is one of the important tributaries of the Saint Lawrence. It rises in Saint Francis Lake, in southeastern Quebec, and after a course of 120 miles enters the Saint Lawrence near Lake Saint Peter.

SAINT GALL (sǎn gāl'), a city of Switzerland, capital of a canton of the same name, six miles southwest of Lake Constance. It is connected with other cities of Europe by a railway line and has a considerable trade. The noteworthy buildings include the public library, the cantonal school, the museum of natural history, and the Roman Catholic cathedral. It has public waterworks, well-paved streets, and electric street railways. Among the manufactures are textile fabrics, chemicals, clothing, and machinery. It was so named from a convent founded here in the 7th century. The German name is *Saukt Gallen*. It has been a part of the Swiss

Confederation since 1803 Population, 1920, 70,437.

SAINT GAUDENS (sânt ga'denz), **Augustus**, American sculptor, born in Dublin, Ireland, March 1, 1848; died March 1, 1907. He was



AUGUSTUS SAINT GAUDENS.

brought to New York City at the age of six months. After attending the public schools, he took instruction in drawing at the Cooper Institute and in 1867 went to Europe, where he studied art in Paris and Rome. His first work of note is "Hiawatha," which he completed in 1871 while at

Rome. He returned to New York in 1872, and in 1893 served as a juror of acceptance in the sculpture department of the Columbian Exposition. Among his principal works are his statues of Abraham Lincoln, in Chicago; Admiral Farragut, in New York; and Robert E. Randall, at Sailors' Snug Harbor, New York. He made a fine statue entitled "Diana" and the hooded figure called "The Peace of God," now in the Rock Creek Cemetery, in Washington, D. C. His portrait busts include those of Theodore D. Woolsey, William M. Evarts, and William T. Sherman. Other works include the fine equestrian statue of General Logan, in Chicago; the equestrian statue of General Sherman, in Central Park, New York; the Shaw Memorial, in Boston, Mass.; the monument of Peter Cooper, in New York; and the fine figure called "The Puritan," in Springfield, Mass.

SAINT GEORGE'S CHANNEL, the body of water which connects the Irish Sea with the Atlantic Ocean and separates the southern part of Ireland from Wales. It is about 100 miles long and from 60 to 95 miles wide. The depth ranges from 300 to 500 feet.

SAINT GERMAIN (sân zhâr-măn'), a town of France, on the Seine River, seven miles west of Paris. It is famous for the Royal Castle that served as a residence for the kings of France until the reign of Louis XIV., who moved the court to Versailles. The place is noted for its many fine monuments, including one erected by George IV. over the remains of James II. of England, who was an exile in the town. It is the seat of a number of monasteries and several convents. A terrace was built along the river front in 1672, and near the town is a splendidly preserved forest of 10,000 acres. The city has railroad advantages and manufactures of various kinds. Near it are fine orchards. Population, 1916, 17,891.

SAINT GOTHARD. See **Gothard, Saint.**

SAINT HELENA (sânt hě-lě'nà), an island in the South Atlantic Ocean, 1,200 miles west of

Portuguese West Africa. It has precipitous shores and a mountainous surface. The area is 47 square miles. The island is of volcanic origin, forming the summit of a former volcano of a submerged region. Diana's Peak is the highest elevation, being 2,750 feet high. A small portion of the surface is susceptible to cultivation and is utilized in the culture of vegetables and fruits. Whale and other fisheries comprise the principal industry. It had a considerable commerce before the Suez Canal was opened to traffic, but at present the trade is principally in fish, which are exported. The imports are articles of food and clothing.

Saint Helena was discovered by the Portuguese in 1502, but it became a British possession in 1651. The island is noted as the place at which Napoleon was exiled after his final defeat at Waterloo, in 1815, and he died there in 1821. He made his home with a farmer named Longwood, and his remains were buried there, but the body was removed to France in 1840, and the Longwood Farm was purchased by the French government in 1858. Gen. Piet Cronje was held there in exile by the British for some time after his capture in the Boer War of 1899-1901. Jamestown, the capital, is the only port and is connected with Europe and South Africa by a cable. In 1916 the island had a population of 7,483.

SAINT HELENS (hě'l'ěnz), a city of England, in Lancashire, ten miles northeast of Liverpool. It is important as a jobbing and manufacturing center. Extensive deposits of coal are worked in the vicinity. Public markets, a sewerage farm, electric lighting, street pavements, waterworks, and street railways are among the public improvements. Other features include the public library, the townhall, and Victoria Park. The manufactures include glass, chemicals, iron, copper, and lead. It has a large trade in produce and merchandise. Population, 1921, 96,566.

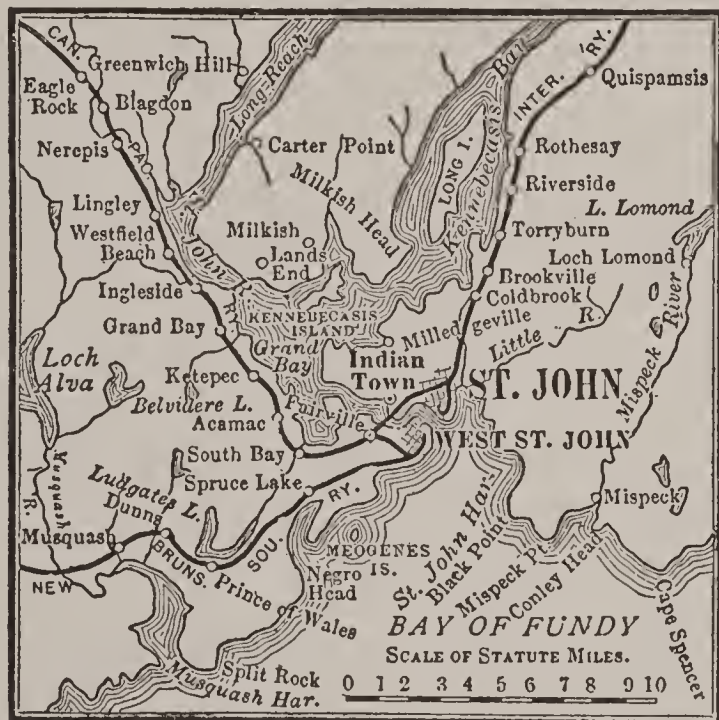
SAINT HYACINTHE (hī'á-sínth), a city of Quebec, capital of Saint Hyacinthe County, 35 miles northeast of Montreal. It is on the Yamaska River and the Grand Trunk, the Canadian Pacific, and other railroads. The chief buildings include the county courthouse, the Saint Hyacinthe College, the city hall, and a monastery of the Dominicans. It has manufactures of hosiery, boots and shoes, leather, woolen goods, and machinery. Electric lighting, waterworks, and pavements are among the public utilities. The inhabitants consist chiefly of French Canadians. Population, 1921, 10,859.

SAINT IGNATIUS COLLEGE (īg-nā'shī-ŭs), an institution of higher learning in Chicago, Ill., under the Jesuit Fathers. It was founded in 1870 and holds high rank among the Roman Catholic institutions. The courses include theology, logic, ethics, astronomy, chemistry, metaphysics, geology, elocution and literature, and languages. It has 650 students.

SAINT JEAN, or **St. John's**, capital of Saint John's County, Que., 30 miles southeast of Montreal, on the Richelieu River, opposite Iberville. It has manufactures of sewing machines, furniture, brick, and machinery. The chief buildings include the courthouse, post-office, and College Le Monnoir. The place was settled in 1748. Population, 1921, 7,734.

SAINT JOHN, a river of North America, which rises in eastern Maine. After flowing northeast for some distance, it makes a bold curve and flows toward the southeast, entering the Bay of Fundy. The tributaries include the Big Machias, Aroostook, Allegash, and Tobique rivers. The entire course is 450 miles, of which 150 miles are navigable. It forms the boundary between Maine and New Brunswick nearly to Grand Falls, below which it is in the latter.

SAINT JOHN, a seaport of New Brunswick, capital of Saint John County, on the Bay of Fundy and the Saint John River. It is on the Canadian Pacific, the New Brunswick South-



ern, and the Intercolonial railways. The harbor is deep and safe, being protected by a breakwater and by Partridge Island, which has a lighthouse and a quarantine hospital. Two bridges, one a cantilever and the other a suspension bridge, span the river. The site rises rapidly from the harbor and is chiefly rocky and undulating, but the streets are wide and regularly platted. It has an extensive trade in lumber, fish, merchandise, and manufactures. Among the principal industries are shipbuilding, fisheries, and the manufacture of clothing, lumber products, and machinery.

A large majority of the business houses are constructed of brick and stone. The noteworthy buildings include the county courthouse, the public library, the Soldiers' Home, the high school, the Roman Catholic cathedral, the Baptist Seminary, the Masonic and the Odd Fellows' halls, the Wiggins Orphan Asylum, and the Provincial Insane Asylum. It has electric street railways, systems of sewerage and waterworks, and stone and macadam pavements. Saint John was settled in 1635 and was long a point

of contention between the French and English, but became a British possession by the Treaty of Utrecht in 1713. It was chartered as a city in 1785. Population, 1919, 39,870.

SAINT JOHN, **John Pierce**, public man, born at Brookville, Ind., Feb. 25, 1833; died Aug. 31, 1916. He studied in his native State and in 1862 enlisted in the Federal army, attaining to the rank of lieutenant colonel. Subsequent to the war he settled in Missouri and later removed to Kansas, where he was elected Governor in 1879. In that capacity he did much to suppress the liquor traffic, and in 1884 was nominated for President on the Prohibition ticket. In 1896 he advocated bimetallism and was prominent as a supporter of Bryan for President in 1900. He lectured extensively on the subjects of prohibition and woman's suffrage.

SAINT JOHN OF JERUSALEM, **Knights of**, an association of a military and religious character founded at Jerusalem in the Middle Ages. The merchants of Amalfi obtained permission, in 1023, from the Caliph of Egypt to found an institution in Jerusalem for the care of poor and sick pilgrims. The fame of this organization was spread throughout Europe by grateful travelers, who recommended it to those wishing to see the Holy City, and many sent contributions to improve and enlarge its capacity. Although it had a humble beginning, it became a highly successful institution and was the direct cause of founding the Order of Saint John. When Jerusalem was taken by the Crusaders under Godfrey de Bouillon, his soldiers were attended in the Amalfi Hospital of Saint John under the direction of its rector, Peter Gerard. A regularly constituted religious body was formed under the rector, which received the approval of Pope Paschal II. in 1113, and soon after commanderies were established in many Mediterranean towns to protect pilgrims as they passed to and from Jerusalem, and these in time became known as *Hospitallers*.

The order gradually grew in military and aristocratic power for a century, but in 1289 an Egyptian force was sent to besiege Acre, which was the only remaining Christian seat of influence at that time, but it fell soon after. The knights sailed to Cyprus in 1291 and vainly tried to reestablish a foothold in Palestine, but they were finally compelled to abandon the project and, instead, undertook the conquest of Rhodes, which was taken in 1310 along with a number of other islands. Here they not only established themselves, but greatly improved the islands, constructing edifices, places of worship, and hospitals. They developed the culture of vegetables, cereals, and fruits. For more than 200 years they maintained themselves against repeated attacks of the Turks, but the fall of Constantinople gave the Mohammedans material advantage and Sultan Solyman finally captured Rhodes in 1523.

The homeless knights were provided for by

Emperor Charles V., of Germany, ceding to them the islands of Malta and Gozo and the fortress of Tripoli in Africa, but they never regained their former importance. However, the powerful fortress of Malta became the bulwark of Christendom and its name was assumed by the order, which became known as the Knights of Malta. In 1551 the Turks conducted a fruitless attack on the island and made a second attack in 1565. The defense under the grand master, Jean Parsiot de la Valette (1494-1568), forced the besiegers to retire. However, they were weakened by divisions that had existed for several centuries, and the crushing blow came in 1792, when the directory of France decreed that the order should be abolished, because it had become an asylum for French refugees. Malta was forcibly seized by the French in 1798, since which time the order has been divided by factions. Several branches are still in existence in Europe, including the German and Italian leagues and the Johanniter. The Hospitalers adopted a Maltese cross as their badge. They wore a red coat and had as their motto *pro fide*, to which they added *pro utilitate hominum*, meaning "For the faith and for the service of men."

SAINT JOHN'S, the capital of Newfoundland, in Saint John's County, on the eastern shore of the island, sixty miles north of Cape Race. It is on the Newfoundland Railway and on Freshwater Bay, an inlet from the Atlantic, which furnishes a landlocked harbor. The Narrows, a channel between Pancake Rock and Chain Rock, furnishes a deep entrance into the harbor. Lighthouses of modern construction are located on Cape Spear and Fort Amherst, which comprise two elevations at the Narrows. It has large commercial interests, especially in supplies for fisheries. The manufactures include spirituous liquors, boots and shoes, nails, tobacco, leather, soap, cordage, seines, furniture, and machinery. The export trade in fish and seal oil is extensive.

Saint John's is well built of brick and stone. The noteworthy buildings include the Governor's residence, the House of the Assembly, the Saint John's Athenaeum, the commercial exchange, the customhouse, the county courthouse, the public hospital, and the Roman Catholic cathedral. It is the seat of Anglican, Presbyterian, Methodist, and Roman Catholic colleges. The public utilities include public waterworks, sanitary sewerage, and gas and electric lighting. It was a fishing village as early as 1580. Disastrous fires destroyed much of the city in 1846 and 1892, but it has been rebuilt and greatly improved. Population, 1901, 29,594; in 1921, 32,992.

SAINT JOHN'S, a river of Florida, which rises in Brevard County and, after a course of 350 miles toward the north, flows into the Atlantic Ocean fifteen miles northeast of Jacksonville. It courses through a level region con-

taining many orchards and groves, and is fed by springs and the overflow of swamps. For a distance of 200 miles of its lower course it is about a mile in width, and it is navigable for the largest steamers to Enterprise. It abounds in fish, and near it are extensive forests.

SAINT JOHNS, a city of Porto Rico. See **San Juan**.

SAINT JOHNSBURY, a village of Vermont, county seat of Caledonia County, 35 miles northeast of Montpelier. It is on the Passumpsic River and the Boston and Maine and other railroads. It is the seat of Fairbanks Museum and the Saint Johnsbury Academy. Among the chief buildings are the county courthouse, the public library, and several fine schools and churches. It has a large trade in merchandise and produce. The works of the Fairbanks Scale Company are located here. Besides scales of various kinds, it has manufactures of steam hammers, clothing, hardware, and farm machinery. Electric lighting, waterworks, and sewerage systems are maintained. The place was settled in 1786 and incorporated in 1884. Population, 1920, 7,163.

SAINT JOSEPH, a city of Michigan, county seat of Berrien County, sixty miles northeast of Chicago. It is beautifully located on the shore of Lake Michigan, at the mouth of the Saint Joseph River, and has communication by the Père Marquette, the Lake Shore and Michigan Southern, and other railroads. Steamers sail regularly between it and other lake ports. It is visited during the summer as a resort by tourists. The surrounding country has productive farms and extensive peach orchards. Flour, ironware, lumber products, canned fruits, and machinery are among the manufactures. Systems of electric lighting, waterworks, and sewerage are maintained. The Carnegie Library and the county courthouse are the leading buildings. The first settlement in the vicinity was made in 1829. It was incorporated as a village in 1836 and as a city in 1892. Population, 1904, 5,322; in 1920, 7,251.

SAINT JOSEPH, the third city of Missouri, county seat of Buchanan County, on the Missouri River, 65 miles northwest of Kansas City. It has transportation facilities by the Chicago Great Western, the Chicago, Rock Island and Pacific, the Chicago, Burlington and Quincy, the Atchison, Topeka and Santa Fé, the Missouri Pacific, and other railroads. Electric lines furnish urban and interurban communication. It is connected with Elmwood, Kan., by a steel bridge.

Saint Joseph occupies an area of ten square miles. The location along the bluffs of the Missouri affords a healthful site and easy facilities for drainage. The river frontage is about three miles. The streets are regularly platted and many are paved, including pavements constructed of vitrified brick, macadam, and asphalt. Krug Park, in the northern part

of the city, is a fine public resort. Lake Contrary is located in the southern part. Mount Mora Cemetery is a fine public burial ground. The chief buildings include the city hall, the county courthouse, the post office, the public high school, and the Carnegie Library. It is the seat of a State hospital for the insane, the State fish hatchery, the Sacred Heart Academy, and the Memorial Home for Aged People. Among the charitable institutions are Saint Joseph's Hospital and Ensworth Hospital. It has two medical colleges and a number of private and parochial schools.

Saint Joseph is noted as a shipping and slaughtering center. It takes high rank in meat packing, wholesaling, and manufacturing. The output of the packing houses has an annual value of \$52,500,000 per year. Articles of clothing, especially shirts and overalls, are made in large quantities. Other manufactures include saddlery, furniture, flour, crackers, confectionery, boots and shoes, woolen goods, and machinery. It has extensive grain elevators and large shipments of cereals, fruits, and live stock.

Indian traders and trappers made settlements in the vicinity of Saint Joseph in 1826. The most important of these was at Roy's Branch, where Joseph Robidoux, a Frenchman, opened a trading post. The Blacksnake Hills, now in the heart of the city, were settled in 1830. The name was changed to Saint Joseph in 1843 and it was made the county seat in 1846. After the discovery of gold in California, it ranked as an important emigrant station. Since the close of the Civil War it has grown very rapidly, and has been improved by extensive systems of waterworks, sewerage, and electric and gas lighting. Population, 1900, 102,979; in 1920, 77,939.

SAINT-JUST (sǎn-zhüst'), **Antoine Louis de**, eminent Revolutionary leader, born at Decize, France, Aug. 25, 1767; guillotined July 28, 1794. He first studied at Soissons, but later took a law course at Rheims, where he became imbued with republican ideas and entered the electoral assembly immediately on attaining his majority. A strong friendship sprang up between him and Robespierre, and the two became intimately connected in the great events associated with the Revolution. He was made president of the convention in 1793. At the sitting of the ninth *Thermidor*, the name of the eleventh month in the calendar of the first French Republic, he made a report that expressed his own views against the king and in favor of a republic. Before concluding his report, he was violently interrupted, and both he and Robespierre were arrested immediately after the sitting. The two perished on the same day along with twenty others, nearly all young men, Robespierre being 36 and Saint-Just 26 years old. His chief writing is an essay entitled "The Spirit of the Revolution."

SAINT LAWRENCE (sǎnt la'rɛns), a river

of North America, the outlet of the Great Lakes into the Atlantic Ocean through the Gulf of Saint Lawrence. It may be said that it includes as its basin all the vast region tributary to the Great Lakes, which embraces 510,000 square miles, 187,440 square miles being in the United States and 322,560, in Canada. When viewed from this aspect, its source is in the Saint Louis, a river that rises in northern Minnesota and flows into Lake Superior near the city of Superior, Wis. It is known as the Saint Mary's River, or the Narrows, between Lakes Superior and Huron; as the Saint Clair River, between Lakes Huron and Saint Clair; as the Detroit River, between Lakes Saint Clair and Erie; as the Niagara River, between Lakes Erie and Ontario; and from Lake Ontario to the Gulf of Saint Lawrence it is called the Saint Lawrence. From the source of the Saint Louis to the mouth of the Saint Lawrence the distance is 2,150 miles and from Lake Ontario to the Gulf of Saint Lawrence, 750 miles. As it emerges from Lake Ontario it forms a broad channel that is filled with islands, being known as the Thousand Island Park.

Steamers from the Atlantic formerly ascended the Saint Lawrence only to Montreal, a distance of 600 miles, but now they may navigate the entire lake and river system. Canals are utilized to pass the rapids between Montreal and Lake Ontario, which consist principally of the Lachine, the Cascade, the Coteau, the Cedar, and the Long Sault rapids. Niagara Falls is passed by the Welland Canal and Lake Superior is reached through the Saint Mary's Canal, which passes around the Sault Sainte Marie rapids. The principal tributaries of the Saint Lawrence proper are the Richelieu, Saguenay, Ottawa, Saint Maurice, Chaudiere, and Saint Francis rivers. At its entrance into the Gulf of Saint Lawrence it forms a broad inlet about 100 miles wide, but the general width to Lake Ontario is from one to four miles. Navigation is entirely obstructed by ice during the winter months. The Saint Lawrence forms a part of the boundary between the United States and Canada, separating New York from the Province of Ontario.

SAINT LAWRENCE, Gulf of, an inlet from the Atlantic Ocean, on the northeastern shore of North America. It is partly inclosed by Newfoundland, Nova Scotia, New Brunswick, and Quebec. The Gulf of Saint Lawrence forms a large continuation of the estuary of the Saint Lawrence River, and communicates with the open sea by Cabot Strait, between Nova Scotia and Newfoundland, which has a width of 65 miles. It is also joined to the Atlantic by the Strait of Belle Isle, lying between Labrador and Newfoundland, and by the Gut of Canso, between Nova Scotia and Cape Breton. It has excellent fisheries. The principal islands in the gulf are Prince Edward, Anticosti, Saint Paul's, and Magdalen.



THE THOUSAND ISLANDS, ST. LAWRENCE RIVER

Where the St. Lawrence River forms the international frontier the stream is broken into a maze of narrow and intricate passages by the myriad islets that project from the river's bed. The Lost Channel is a passage lying near to the Canadian shore and often is used by tourist boats. Its scenery, embracing a vista of rocky and wooded islands, is very beautiful and is typical of this portion of the river
(Art. Saint Lawrence River)

SAINT LEGER (ləj'ēr), **Barry**, soldier, born in England in 1737; died in 1789. He descended from Huguenot parentage, studied at Cambridge, and entered the army as an ensign in 1757. The following year he was sent to America to fight against the French under General Abercrombie, and in 1758 participated in the siege of Louisburg. Later he fought under Wolfe at Quebec, where he was promoted to the rank of brigadier major. In 1777 he commanded one of the three expeditions sent into New York, but was defeated at the Battle of Oriskany, hence was prevented from joining Howe and Burgoyne at Albany. Soon after he was recalled to Canada, where he continued to serve on the border of the American colonies. He was promoted to the rank of colonel in 1780 and conducted a guerilla warfare, with headquarters at Montreal, until the close of the Revolutionary War.

SAINT LOUIS (lōō'is), the largest city of Missouri, metropolis of the Louisiana Purchase, the fourth city of the United States, being exceeded in size by New York, Chicago, and Philadelphia. It is situated on the Mississippi River, about 20 miles below its confluence with the Missouri, and 282 miles southwest of Chicago, Ill. The city is finely located on the west bank of the river, directly opposite East Saint Louis, Ill., with which it is connected by the famous Eads Bridge.

DESCRIPTION. The city limits include an area of nearly seventy square miles and the river frontage is a little over nineteen miles. It extends west from the river about six miles, stretching over a beautiful and gently rolling tract of land. The site rises gradually from the river to the vicinity of Broadway, one of the leading thoroughfares running in a direction north and south, but paralleling the river. Between Broadway and the river is the original site, where the streets are somewhat narrow and much jobbing and wholesaling is transacted. From Market Street, which divides the city into northern and southern portions, the buildings are numbered north and south, and the buildings of intersecting streets are numbered westward from the river. In general the streets running north and south are designated by number, beginning with First Street near the river, and the streets running east and west are designated by name. In numbering the buildings, each block begins with a new hundred. Washington Avenue and Olive Street are the principal thoroughfares running east and west. Many wholesale and retail stores are located on these streets near the river, while fashionable residences line them at the west end. Lindell, Grand, Chouteau, and Franklin avenues are among the leading thoroughfares. Many of the principal streets and avenues are beautified by parks and additions platted independent of each other.

Much has been done in the way of grading

to beautify the city. It has about 425 miles of improved streets, many of which are paved with granite blocks, asphalt, vitrified brick, and macadam. The sewer system comprises 550 miles of mains, and about an equal amount of water mains has been constructed. A large part of the electric wires are below the surface, the conduits for this purpose aggregating about 200 miles. Intercommunication is furnished by a system of electric railways, which has branches extending to East Saint Louis and many other cities and interurban points. Street lighting is furnished by gas and electricity. Practically all of the public utilities are owned and controlled by the municipality.

PARKS. About 2,250 acres are included in the parks and squares. Forest Park, the largest in the city, has an area of 1,375 acres. It is located on the west side, in a beautiful residential district, and a part of it was used in 1904 for the Louisiana Purchase Exposition. In the southwestern part are Tower Grove and the Missouri Botanical Garden, both presented to the city by Henry Shaw. They contain one of the most extensive collections of native and forest plants. The former has many beautiful drives and walks and statues of Columbus, Humboldt, and Shakespeare. The latter is popularly known as Shaw's Garden and is famous for its arboretum and the recumbent portrait statue of Henry Shaw by Von Mueller. O'Fallon Park, a tract of 160 acres, borders the bluffs of the river on the north side and contains a race course and a zoölogical garden. Carondelet Park, on the south side, is noted for its beautiful scenery. A marble statue of Schiller is in Saint Louis Park, one of Thomas H. Benton is in Lafayette Park, and one of General Grant stands at the southern entrance of the city hall.

BUILDINGS. Saint Louis is substantially built and contains many noteworthy and costly structures of modern design. The newer buildings are almost exclusively of stone, much of which is quarried within the State. The Union Railroad Station is one of the finest railroad depots in the world, costing \$6,750,000 and having a trainshed covering over thirty tracks. The Federal building, erected at a cost of \$8,000,000, is located on Olive Street. It contains the post office, the customhouse, and the United States subtreasury. An entire square is occupied by the city hall, which is a modern structure and cost about \$2,500,000. The county courthouse, on Broadway, is on the classic style and has a dome 198 feet in height. Among the hotels may be mentioned the Southern, the Planters', and the Lindell, all of which are modern and commodious structures. The leading business and office buildings include the Laclede, the Rialto, the Equitable, the Commonwealth Trust, the Commercial, the board of education, and the public library buildings. Few cities are better equipped with ecclesiastical structures.

They include the Protestant Episcopal Cathedral, the Shaare Emeth synagogue, the Roman Catholic cathedral, the Second Presbyterian church, the Beaumont Street Baptist church, the Pilgrim Congregational church, and the Union Methodist Episcopal church.

EDUCATION AND CHARITIES. Saint Louis maintains a thorough system of public school education, which includes well-articulated courses from the kindergarten to the high school. Washington University, located near Forest Park, is the leading institution of higher learning. Other institutions of higher learning include the University of Saint Louis (Roman Catholic), the Lutheran Concordia Theological Seminary, the Christian Brothers' College, and the Forest Park University for Women. The charitable and benevolent institutions include the Saint Louis Training School for Nurses, the Missouri School for the Blind, and various institutions for infants and adults. It is the seat of the Beaumont Medical College, the Kenrick Theological Seminary, the Saint Louis School of Pharmacy, and the Saint Louis School of Fine Arts.

The public library, aided by Andrew Carnegie, has a fine building and 175,000 volumes. On Broadway and Locust streets is the Mercantile Library, which has a collection of 130,000. This institution is famed for its fine paintings and statuary, including much of interest relating to the Louisiana Purchase and the states formed from it. All phases of club life are represented by strong organizations, such as the Mercantile, the Columbia, the German Turner, and the Saint Louis. The Olympic, the Columbia, and the Grand Opera are the principal theaters.

COMMERCE AND INDUSTRY. Saint Louis is located at an advantageous point on the Mississippi, which furnishes direct steamboat transportation to the Gulf of Mexico and many points on the Ohio and Missouri rivers. As a railway center it may be said to rank next to Chicago, being on direct lines of many trunk railroads. Twenty-four lines enter the city. Among the principal railroads are the Illinois Central, the Wabash, the Chicago, Burlington and Quincy, the Chicago and Alton, the Louisville and Nashville, the Missouri, Kansas and Texas, the Saint Louis, Iron Mountain and Southern, the Saint Louis and San Francisco, the Pennsylvania Lines, the Baltimore and Ohio Southwestern, and the Chicago, Rock Island and Pacific. The railways passing toward the east either cross the Eads Bridge, which is within the heart of public intercourse, or the Merchants' Bridge, which has connection with the Union Station system of terminals partly by an elevated line. Trains going from the Union Station to the Eads Bridge pass through a tunnel under the city. Cupples Station, a group of business buildings, is located so as to handle a large share

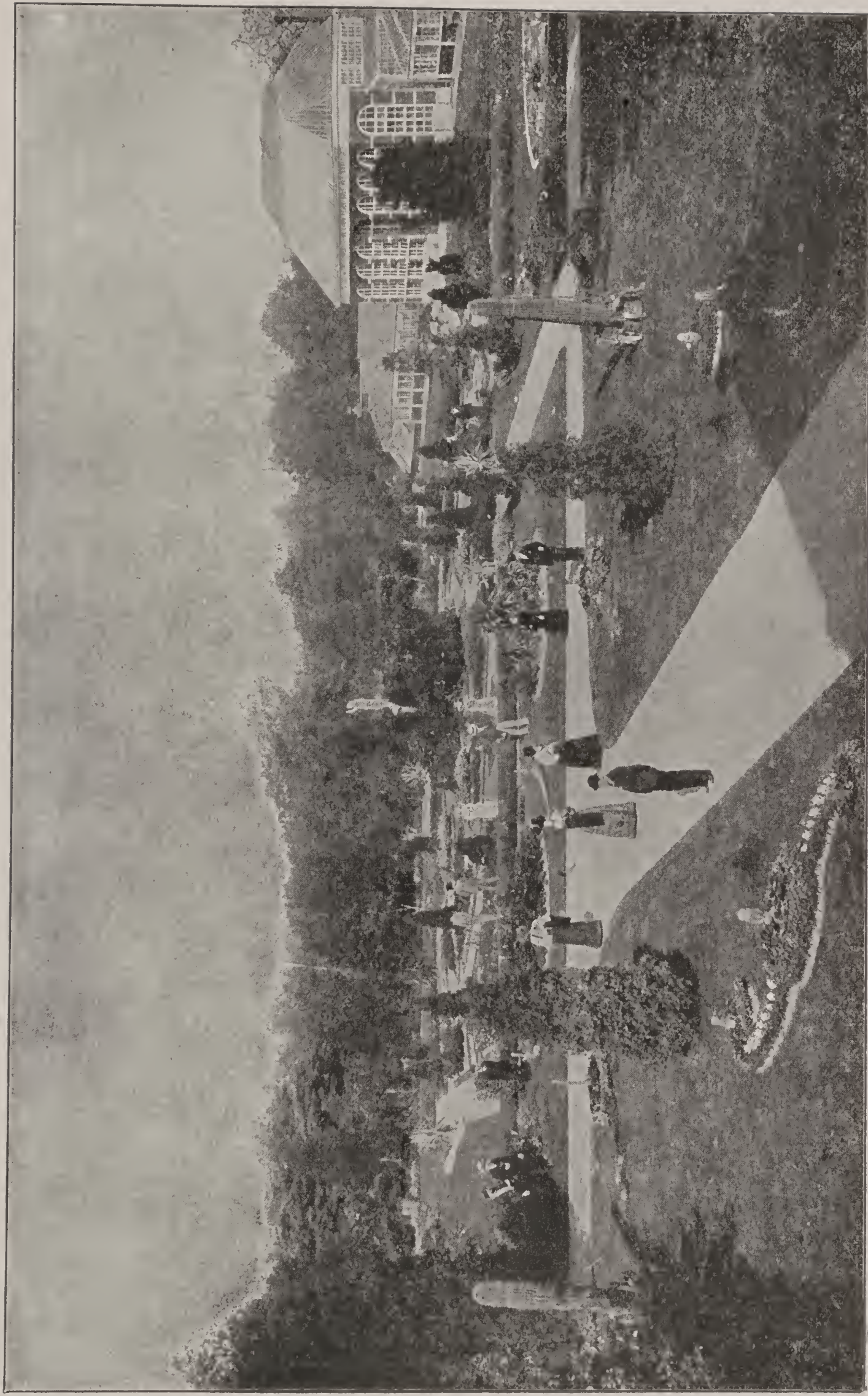
of the wholesale trade and much of the freight with facility.

In manufacturing Saint Louis holds a high rank. The annual output of its factories has a value of \$350,000,000. Nearly all lines of manufacturing are represented and the products find a market in all parts of the country and many foreign lands. Malt and spirituous liquors, flour and grist, boots and shoes, brick and pottery, wagons and carriages, iron and steel products, furniture, millinery, glassware, railroad cars, and machinery are the leading manufactures. As a market for grain, cotton, live stock, coal, hides, and fruits it holds a very high rank. Its stock yards and grain elevators are among the largest in the Mississippi Valley. Vast numbers of hogs, cattle, and sheep are handled at the packing houses.

HISTORY. The first permanent settlement on the site of Saint Louis was made by Pierre Laclède Liguist, in 1764, who had conducted a company of French trading merchants to develop that region of the Louisiana Territory. However, the title became vested in Spain and the town was occupied by Spanish troops in 1771, but the territory of Louisiana was ceded back to France in 1800. In 1803 the United States purchased Louisiana from Napoleon, but Saint Louis continued a trading point until its steady growth began in 1830. The Revolution of 1848 in Germany caused a large number of German immigrants to come to Saint Louis, and from that time the city has enjoyed a remarkable growth in wealth and population. The German element was devotedly loyal to the Union in 1861 and under General Lyon captured Camp Jackson. A very large per cent. of the people are German or of German descent, which is evidenced by numerous well-organized musical societies maintained in the city. A destructive cyclone visited the city in 1896, destroying property valued at about \$25,000,000, but the damaged parts were rapidly rebuilt by the construction of newer and more valuable buildings. Forest Park and the campus of Washington University, in the western part, furnished the site of the Louisiana Purchase Exposition in 1904. Table of population follows:

YEAR.	POPULATION.	YEAR.	POPULATION.
1799.....	929	1866.....	204,327
1810.....	1,400	1870.....	310,864
1820.....	4,928	1880.....	350,518
1830.....	5,862	1890.....	451,780
1840.....	16,469	1900.....	575,238
1850.....	74,439	1910.....	687,029
1856.....	125,200	1920.....	772,897

SAINT LOUIS, a city in West Africa, capital of Senegal, about 12 miles from the Atlantic Ocean and 100 miles northeast of Cape Verde. It is situated on an island at the mouth of the Senegal River and has railway communication with the interior. The streets are regularly platted and well improved, but the climate is unfavorable to Europeans. The noteworthy buildings include the customhouse, the post of-



A VIEW IN SHAW'S GARDEN, ST. LOUIS, MO.

Shaw's Garden is one of the chief points of interest in St. Louis. It is the creation of Henry Shaw, an Englishman by birth, whose large fortune was made in St. Louis and whose desire was to make this the greatest botanical garden in the world. It already surpasses every similar institution, with the single exception of the celebrated Kew's Garden in England. The Shaw mausoleum, containing the founder's remains, is in the Garden.

(Art. Saint Louis)

rice, and a missionary school. It has considerable trade in grain and fruits, but the harbor is not suitable for large vessels. The town was founded in 1626 and the inhabitants consist chiefly of French and natives. Population, 1916, 25,086.

SAINT LOUIS, University of, an institution of higher learning at Saint Louis, Mo., under control of the Jesuit Fathers. The courses include medicine, commerce, philosophy, sciences, divinity, and military science. The property is valued at \$1,250,000. It has a library of 25,000 volumes. The faculty consists of 235 instructors. It is attended by about 1,500 students.

SAINT LUCIA (lōō'shà), an island of the West Indies, situated 25 miles north of Saint Vincent. It has an area of 230 square miles. The surface is mountainous and contains a number of active volcanic peaks. Sugar, coffee, spices, logwood, and fruits are the principal products. The island was discovered in 1502 and became French territory, but has been a British possession since 1803. The inhabitants consist mostly of Negroes. Castries is the capital and principal port. Population, 1916, 54,073.

SAINT MARK, Cathedral of, a noted ecclesiastical structure at Venice, Italy. It is situated at the east side of the Square of Saint Mark's, or the Piazza, and is reputed one of the finest structures of its kind in Europe. The building is 250 feet long and 170 feet wide and is decorated by several fine porches. Emperor Nero is said to have received as a present the famous four bronze horses that were set above the central porch, but later they were taken to Constantinople, whence they were brought to Venice. The roof is decorated with numerous cupolas and arches and the interior is finished with beautiful and costly mosaics. Within the cathedral are many artistic treasures, such as church plates and jeweled bookbindings. Work on the original building was begun in 830, but it was destroyed and was again rebuilt in 976. A fire destroyed the second church and a new structure in the Byzantine style was erected in the 12th century. Additions in the Gothic were made in the 15th century. It was attached to the palace of the doge of Venice and remained a place for national worship for many years, but was converted into a cathedral in 1807.

SAINT MARYS, a city of Ohio, in Auglaize County, on the Miami and Erie Canal, 22 miles southwest of Lima. It has transportation facilities by the Ohio Central and the Lake Erie and Western railways, and is surrounded by a farming and fruit-growing country. Population, 1900, 5,359; in 1920, 5,679.

SAINT MARY'S RIVER, the channel separating the Upper Peninsula of Michigan from Ontario and connecting lakes Superior and Huron. It is about sixty miles long, flowing

in a southeasterly direction, and is divided into two main channels by a number of large islands. The Sault Sainte Marie, or Saint Mary's Falls, are a short distance below Lake Superior. They have rapids that fall twenty feet in the course of about one mile. Two ship canals are maintained to avoid the rapids, one on the American and one on the Canadian side. The tonnage of the traffic passing through these canals is enormous, exceeding that of the Suez Canal.

SAINT MAURICE (săn mō-rēs'), a river in the Province of Quebec. It rises in Lake Oskelanaio. At first it has an eastward, but later a southward, course, and joins the Saint Lawrence at Three Rivers, about midway between Montreal and Quebec. It flows through a heavily timbered country, and about 22 miles above its mouth are falls with a descent of 160 feet. The entire length is 300 miles. Among the principal tributaries are the Ribbon, the Vermilion, the Croche, and the Bastonnais.

SAINT MIHIEL, a city of France, in the department of Meuse, 115 miles northeast of Paris. It is a railway center and has two famous churches. Throughout the war it was the scene of heavy fighting, until 1918, when the Americans undertook their first great offensive at this place under General Pershing. They defeated the Germans and compelled them to retreat with heavy losses. Population, 1919, 10,740.

SAINT PAUL, the capital of Minnesota, county seat of Ramsey County, on the Mississippi River, immediately east of Minneapolis. It is at the head of navigation, 410 miles northwest of Chicago, Ill., and has communication by extensive trunk railway systems. These include lines of the Chicago Great Western, the Northern Pacific, the Wisconsin Central, the Great Northern, the Chicago and Northwestern, the Minneapolis and Saint Louis, the Chicago, Burlington and Quincy, the Chicago, Milwaukee and Saint Paul, the Illinois Central, and other railroads. An extensive system of electric railways has lines to all parts of the city and furnishes direct connections with Minneapolis, Lake Minnetonka, Fort Snelling, Stillwater, and other points.

DESCRIPTION. The city is finely situated on a gently rolling tract of land, which embraces an area of about 60 square miles. In most places the ground rises gradually from the river, and the general altitude is from 100 to 200 feet above the Mississippi and about 800 feet above sea level. The larger part of the city is located on the north side of the river, which has a general direction toward the northeast at this place, but makes a bold curve near the Union depot, whence it flows toward the southeast. The portion lying on the south side is known as South Saint Paul, which is connected with the north side by numerous wagon and railroad bridges. Another bridge spans the river at Fort Snelling and several bridges furnish connection with Minneapolis. The streets

are regularly platted, crossing each other at right angle in most parts of the city, though some of the thoroughfares near the river are somewhat irregular. Many of the streets are well paved with granite blocks, vitrified brick, asphalt, and macadam. They are well lighted with gas and electricity, are carefully drained of surface water, and contain extensive systems of sewerage and water mains.

PARKS. Como Park, which includes Lake Como, is located in the northwestern part of the city. It has an area of 415 acres and contains many rare shrubs, trees, and flowering plants. Indian Mounds Park, on the bank of the Mississippi, has several bluffs 200 feet high. Lake Phelan, in the northeastern part, is a beautiful sheet of water and is noted for its fisheries. In the western part of the city, along the gorge of the Mississippi, is a finely wooded tract and a short distance west are Fort Snelling and Minnehaha Falls. The parks that belong to Saint Paul proper, both large and small, include about 1,000 acres. They are connected by driveways and boulevards of great beauty, passing in places along the river, over elevations, and to the lakes. In the northwestern part, due west of Como Park, are the State Fair Grounds and the State University Farm.

BUILDINGS. On a lofty eminence, within the heart of the city, is the State capitol building. It is constructed largely of Georgia marble with the foundation and steps of Minnesota granite, and is rated one of the finest structures of its kind in America. The magnificent dome is visible as the city is approached from almost any direction. The building was erected at a cost of \$4,500,000. Opposite Rice Park is the post office, constructed of a gray stone. The city hall and county courthouse occupy an entire square on Fourth and Wabasha streets. Near the river is the Union Station, which is entered by all the trains. The larger office and business buildings include the Pioneer Press, the Endicott, the Manhattan, the Globe, the Germania, the German-American Bank, and the New York Life. Other buildings of note include the Ryan Hotel, the Capital Bank, and the Newspaper Row.

EDUCATIONAL. As an educational center it takes high rank, having a system of well-organized public schools and many institutions of higher learning. The institutions in or near the city include Macalester College, Saint Paul Seminary, the College of Saint Thomas, the Lutheran Concordia College, and the Hamline University. Many private and parochial schools are maintained. Magdalen Hospital, an orphan asylum, and many educational and scientific institutions are well patronized. Three libraries are maintained. These include the State Historical Library with 75,000, the City Library with 60,000, and the State Law Library with 32,000 volumes. The Agricultural College of

the State University, near Saint Anthony Park, is located on a farm of 243 acres.

INDUSTRIES. The city owes its prosperity largely to navigation on the Mississippi and the numerous railroads that center here. Its railroad yards, terminals, and shops are among the largest in the Union. It has extensive stock yards, located at South Saint Paul, and takes high rank as a slaughtering and meat-packing center. Many large flouring mills and grain elevators are operated. It has an extensive trade in farm produce, live stock, merchandise, and food stuffs. Furniture, hardware, earthenware, clothing, cigars, crackers, and machinery are produced in large quantities. The wholesaling and jobbing district is located near the Union Station, and along the banks of the Mississippi are most of the railroad shops and manufactories. The banks of the Mississippi have been partly diked to insure the manufacturing districts against overflow.

HISTORY. The site of Saint Paul was first settled in 1838 by a Canadian, who built a log cabin. In 1839 the first white child was born here and the town site was platted in 1847. The Indians had a village on the site known as *Imnijiska*, meaning White Rock, and for some time it was known as Saint Peter, which was formerly the name of the Minnesota River. It was made the territorial capital in 1851 and a railroad line was built from it to Saint Anthony Falls, a distance of ten miles west, in 1862. Saint Paul and Minneapolis have been building toward each other with much rapidity, in fact the two cities are continuous, and are commonly spoken of as the *Twin Cities*. Nearly one-third of the inhabitants are of foreign birth, the larger part being Germans, Swedes, and Irish, in the order named. Population, 1920, 234,595.

SAINT PAUL DE LOANDA. See **Loanda**.

SAINT PETER, a city in Minnesota, county seat of Nicollet County, on the Minnesota River, 75 miles southwest of Minneapolis. It is on the Chicago and Northwestern Railroad and is surrounded by a fertile farming country. The noteworthy buildings include the county courthouse, the high school, the public library, the State hospital for the insane, and the Gustavus Adolphus College (Lutheran). Among the manufactures are flour, earthenware, furniture, machinery, and clothing. It has electric lighting, public waterworks, and sanitary sewerage. The place was settled in 1854, incorporated in 1858, and chartered as a city in 1891. Population, 1905, 4,514; in 1920, 4,335.

SAINT PETERSBURG, or Petrograd, the capital of Russia, at the eastern end of the Gulf of Finland, where the gulf is entered by the Neva River. This stream divides into numerous branches, thus forming a large number of islands, which are occupied by the city and connected by many bridges. Much of the city is built on flat ground, which was formerly marshy, and portions of it are still liable to

overflow when the sea level is raised by high winds blowing from the west. A systematic plan of continually building the city further toward the sea and redeeming tracts covered by water has been pursued for many years, thus adding to the extent of the city and improving its means of access by vessels. Improvements have been made by the construction of concrete and granite embankment, and many of the channels have been greatly deepened by dredging.

DESCRIPTION. The streets are broad and regularly platted, intersecting each other at right angles. They have adequate lighting by gas and electricity and are traversed by an extensive network of electric street railways, but much of intercommunication is by cabs and carriages. The sewerage and waterworks systems are managed by the municipal government. The pavements are chiefly of granite blocks, but asphalt and macadam constitute the street improvements in the outlying and residential sections. The architecture is largely of pale yellow stone, much of which is both artistic and substantial. Nevsky Prospekt, the most fashionable street, is 130 feet wide and about four miles long. Senate Square, in the heart of the city, contains the famous equestrian statue of Peter the Great, erected in 1782. The Alexander Column, constructed of red granite, is in Palace Square.

The fortress of Saints Peter and Paul is located on a small island, which is connected with the mainland by the Troitsky Bridge. It contains the Cathedral of Saints Peter and Paul, where the czars and many persons belonging to the royal families are buried. The commercial exchange is located on one of the islands and near it are several educational institutions. Peterburgsky Island, one of the finest in the city, contains many beautiful residences, while others are utilized as public parks and resorts. Retail trading is carried on chiefly by a system of markets and these are managed by the municipality. These markets do not only handle food stuffs, but likewise conduct a large trade in clothing and foot wear.

Saint Petersburg is sometimes called the city of palaces from the large number of edifices of that character. Among them is the famous Winter Palace, a residence of the emperor, with a capacity for accommodating 6,000 persons; the Hermitage Palace, containing a library of 125,000 volumes and 2,500 paintings by famous artists; and the Annitchkoff Palace of the czarevitch. Other important buildings include the Cathedral of Saint Isaac, the churches of Saint Peter and Saint Paul, the government buildings, the stock exchange, the Marble Palace, the buildings of the Holy Synod, and numerous hospitals and national institutions. The Academy of Science, founded by Peter the Great in 1725, has a library of 160,000 volumes. Other institutions of higher learning include

the Institute of Technology, the University of Saint Petersburg, and a number of high schools, academies, and theological seminaries. The Imperial Library is noted as one of the most valuable in Europe and has 1,300,000 volumes. It has many benevolent institutions, scientific and educational associations, public parks, museums, botanical and zoölogical gardens, and theaters.

INDUSTRIES. Saint Petersburg has a vast interior and foreign trade. The former is facilitated by a large number of canals and railroads that center in the city. It has a commodious harbor, extensive wharfage, and connection with all important foreign ports by numerous steamship lines. Formerly much of the foreign business was transacted at Cronstadt, a strongly fortified island town west of the city, but now a deep canal facilitates the entrance of the largest sea vessels to the well-improved harbor of the city. About 3,250 ships leave the port annually. The export and import business aggregates annually about \$145,000,000. It is one of the most important wholesale and industrial cities of Russia. The manufactures include, leather, cotton and woolen goods, clothing, gobelin tapestry, spirituous liquors, glass, sugar, tobacco products, porcelain and glass, farming implements, hardware, clothing, and machinery. It has a large trade in corn, fish, rye, wheat, live stock, lumber, and coal.

HISTORY. A settlement was founded at the mouth of the Neva by the Swedes in 1300, but it was soon after destroyed. The region was occupied by Peter the Great in 1703, in which year he began to build the fortress of Saints Peter and Paul. As a means of establishing the influence of Russia among the powers of the Baltic and to become freed from the adverse influences at Moscow, he removed the capital from the latter city to Saint Petersburg in 1712. Many peasants were required by an imperial order to take up their residence in the new city, which began to grow rapidly. Under the successors of Peter it was greatly improved and embellished. Catharine II. promoted the construction of a network of canals inland and drained large tracts of marshy land surrounding the city. She not only built beautiful palaces for the royal family, but constructed a number as a mark of appreciation for her favorites. Compared to other great cities of Europe, it ranks as one of the newest, but must be reckoned among the finest and wealthiest in the world. About 90 per cent. of the inhabitants are Russians and the remainder consists principally of Germans, Poles, and Lithuanians. Population, 1915, 2,082,852.

SAINT PETER'S CHURCH. See **Peter's, Saint.**

SAINT PIERRE (săn pyâr'), an island near the mouth of the Gulf of Saint Lawrence, off the coast of Newfoundland. It and the island of Miquelon, in the Gulf of Saint Lawrence,

constitute a colony of France. The surface is somewhat rocky and more or less barren. This possession is valuable only for its fisheries and as a station for vessels. It is the only remnant of territory in the northern part of North America which belongs to France. The colony has an area of 91 square miles. Saint Pierre, on the island of the same name, is the capital. The colony has a population of 12,350.

SAINT-PIERRE, Jacques Henri Bernardin de, author, born in Havre, France, Jan. 19, 1737; died Jan. 21, 1814. He studied at Caen



J. H. B. DE SAINT-PIERRE.

and Rouen and soon after engaged as engineer in Malta. Later he was employed as engineer in Russia and Germany and in 1766 went to Madagascar and Mauritius, serving the French government as engineer in the latter island for about three years.

He returned to France in 1771 to publish accounts of his different voyages and engaged in various other literary enterprises. His work entitled "Paul and Virginia" is a beautiful story founded on an incident witnessed in Mauritius. It has been translated into many different languages, including the Russian, German, English, Dutch, and Romance languages. Another work of value from his pen is "Voyage to the Isle of France." Napoleon extended many distinguished honors to Saint-Pierre, enabling him to pass the closing years of his life at Eragny in comfortable circumstances.

SAINT QUENTIN (sǎn kǎn-tǎn'), a city of France, in the department of Aisne, on the Somme River, 92 miles northeast of Paris. It has extensive railroad facilities and is on the Saint Quentin Canal, which unites the Somme and the Scheldt rivers. Among the noteworthy buildings are the Church of Saint Quentin, the townhall, the public library, and the Hotel de Ville. Among the manufactures are cotton and woollen goods, embroidery, billiard balls, engines, hardware, and machinery. The surrounding country contains many manufacturing towns and is a productive fruit and dairying region. The Spanish captured Saint Quentin in 1557. On Jan. 19, 1871, it surrendered to the German army, which was commanded by General von Goeben. It was captured by the Germans in 1914 and they held it until 1918, when it was occupied by the Allies after hard fighting. Population, 1919, 56,980.

SAINT-SAËNS (sǎn-sǎn'), **Charles Camille**, musician and composer, born in Paris, France, Oct. 9, 1835. He was able to play the piano at the age of six years, entered the con-

servatory in 1847, and two years later obtained a prize in a competitive test on the organ. In 1853 he became organist of the Church of Saint Méry, which he resigned after five years to accept a similar position at the Church of Madeleine. He gave his entire time to composition and concert work after 1870. In 1894 he was made commander of the Legion of Honor. His productions include symphonies, operas, church music, and oratorios. Among his best known works are the operas "Henry VIII," "Proserpine," and "Samson and Delilah." He died Dec. 16, 1921.

SAINT-SIMON (sǎnt-sí'mŭn), **Claude Henri, Count of**, founder of French socialism, born in Paris, France, Oct. 17, 1760; died there May 19, 1825. He entered the army in 1778, and soon after joined other French nobles in assisting the American colonists in the Revolution. His inclination to take little part in the French Revolution caused him to be deprived of his property, but he afterwards speculated in property secured as a part of the national domain by confiscation from the clergy and nobility, realizing a competence. In 1797 he entered upon a line of study to fit himself for reorganizing society, and traveled extensively in continental Europe to come in touch with and learn of the conditions of the laboring and social classes. His time from 1803 until 1813 was devoted almost exclusively to the study and production of socialistic and political literature, many of his writings attracting wide attention.

The work of Saint-Simon called "The New Christianity" takes the form of a religion and embodies the essential elements proposed by him for the reorganization of social life. He advanced the doctrine that social forces should be directed toward improving the moral and physical conditions of the most numerous and the poorest in society, basing the distribution of wealth on capacity and labor. The ambition with which he endeavored to establish socialism caused him to fall into poverty, and in 1812 a small pension was settled on him. However, his financial straits became so embarrassing that he attempted to commit suicide in 1823, which resulted in the loss of an eye. His socialistic doctrines are generally known as Saint-Simonism. "The Industrial Catechism" is one of his chief works.

SAINT-SIMON, Louis de Rouvroy, Duke of, soldier and author, born in Versailles, France, Jan. 16, 1675; died in Paris, March 2, 1755. He was a descendant from Charlemagne and belonged to a different branch of the Saint-Simon family than the preceding. After studying under the care of his mother until 1693, he entered the military service and gained the confidence of Louis XIV., whom he served as courtier. His tendency to personal independence and rigid morality made him unpopular among the aristocracy of the French court, but he

served there with studious devotion and became well informed in relation to the practices and proceedings of every phase of royal life. The later years of his life were spent in writing his celebrated "Memoirs," which were not published in a complete form until after his death, the first edition appearing in 1830. This work is of much historical value for the reason that it contains useful information in regard to public life in the time of Louis XIV., especially regarding the practices intimately connected with court and official circles.

SAINT SOPHIA. See *Sophia, Church of Saint*.

SAINT THOMAS, the name of two islands, one off the west shore of Africa and the other in the West Indies. The island of Saint Thomas off the west coast of Africa is in the Gulf of Guinea and is a Portuguese possession. It has an area of 355 square miles and produces coffee, sugar, cocoa, vanilla, and tropical fruits. In 1909 it had population 38,463. The island of Saint Thomas in the West Indies belongs to Denmark and is situated 35 miles northeast of Porto Rico. It is 13 miles long from east to west, has an area of 23 square miles, and contains a population of 15,790. Charlotte Amalie, on the south shore, is the capital. The island produces sugar, tobacco, and fruits.

SAINT THOMAS, a city of Ontario, capital of Elgin County, on Kettle Creek, sixteen miles south of London. It is on the Grand Trunk, the Michigan Central, and the Canadian Pacific railroads. The surrounding country is a fertile farming district. Among the principal buildings are the high school, the county courthouse, the public library, and many fine churches. The manufactures include leather, flour, farming implements, railroad cars, and machinery. It has a large trade in grain and merchandise. Population, 1921, 16,026.

SAINT VINCENT (sânt vîn'sant), an island in the West Indies, belonging to the Windward group, 100 miles west of Barbadoes. It has an area of 145 square miles. The soil is generally fertile and the surface is undulating, but a range of volcanic mountains trends from north to south. The most active volcano is in the northwestern part, called La Soufrière, whose extensive crater is about 3,000 feet above sea level. Among the principal exports are molasses, sugar, rum, spices, cocoa, and fruits. Columbus discovered Saint Vincent in 1498. It has been alternately neutral, French, and British, but since 1783 it has constituted a British possession. Kingston is the capital. Population, 1916, 47,055.

SAINT VINCENT, Cape, the southwestern extremity of Portugal, forming an extensive promontory in the Atlantic. Several important naval battles have been fought in its vicinity. In the first, on June 16, 1693, the English under Admiral Rooke were defeated by the French

with the loss of twelve men-of-war and eighty merchantmen. Another battle of importance occurred here on Feb. 14, 1797, in which the English under Sir John Jervis defeated the combined fleet of Spain and France and thus prevented a French invasion of England.

SAINT VITUS'S DANCE, or *Chorea*, a disease of the nerves of motion, causing the extremities and other parts of the body to move involuntarily. It is most common among persons from the age of ten to twenty years and is more frequent in females than in males. The early symptoms include a feeling of languor, a furred tongue, and disorder of the stomach. Usually the patient becomes subject to a sense of awkwardness while in the presence of strangers, owing to sudden muscular contortions. Gradually the muscles cease to be under full control of the will, except by a violent and painful volition. In many cases the hands move suddenly in an opposite direction from the one intended, while the face may be distorted by the spasmodic action of the muscles. All actions of the body become very uncertain. Rest, wholesome exercise, a careful diet, and medical treatment are essential.

SAIS (sâ'ēs), anciently a city of Egypt, on the Canoptic branch of the Nile delta. It is celebrated as the seat of many palaces and temples and because it gave its name to the 24th and 26th dynasties of Egypt. Few ruins are left to indicate its former importance, but those remaining, considered in the light of history, make it certain that it contained a vast sepulcher of Osiris, within whose walls were the tombs of many kings. The 26th dynasty made it the capital of Egypt, but when the political center was removed to Memphis it began to decline. Solon and Pythagoras were among the Grecians to visit Sais. Plato was an instructor in its colleges. Close trade relations were maintained between Sais and Athens. Schiller made the legend of the mysterious veiled statue in the temple of Neith the subject of a ballad.

SAKI (să'kê), a slightly intoxicating beverage manufactured in Japan, which forms the common stimulating drink of the Japanese. It is made from rice and is drunk warm, producing a speedy but transient intoxication.

SALA (sā'là), **George Augustus**, journalist and author, born in London, England, in 1828; died Dec. 8, 1895. He descended from an Italian family and first studied to become an artist, but soon became interested in literature and journalism. At the time of the Civil War in the United States he corresponded to the *London Daily Telegraph*, a position which he also held during the Franco-German War in 1870-71, and later traveled as a correspondent in Russia and Australia. In 1885 he made a visiting and lecturing tour of the United States and in 1892 founded *Sala's Journal*. His best known work include "London up to Date," "My

Diary in America," "In the Midst of the War," "Seven Sons of Mammon," "Paris Herself Again," "From Waterloo to the Peninsula," and "Things I Have Seen and People I Have Known."

SALADIN (sāl'ā-dīn), eminent Sultan of Egypt and Syria, born at Tekrit, a town on the Tigris, in 1137; died in Damascus, March 4, 1193. His real name was Salah ed-Din, meaning holiness of the faith, but European writers have generally adopted the name Saladin. His father was the governor of Tekrit under the Seljuk Turks. He early entered the service of Nureddin, Prince of Syria, accompanying various expeditions to Egypt under command of his uncle, who was a general in the army of the prince. He succeeded his uncle as grand vizier and was soon after attacked at Alexandria by a Christian army, but he succeeded in escaping to Palestine, where he reduced several fortresses and defeated his assailants near Gaza. In 1174 he became Sultan of Egypt and Syria, but not without a prolonged contest for succession. At length his title was confirmed by the Caliph of Bagdad, which so strengthened his cause that he succeeded in annexing Mesopotamia and other regions of Asia, and in 1187 defeated a Christian army at Tiberius. On Oct. 2, 1187, he captured Jerusalem and soon after began the siege of Acre, but the Christian garrison obliged him to retreat.

The success of Saladin in conquering large parts of Syria aroused the Christians of Europe to enthusiasm, who organized the Third Crusade under the kings of France and England, but in the meantime Saladin became master of Acre. The Crusaders reached Acre in 1189 under King Richard of England and King Philip Augustus of France and, after a siege of two years, succeeded in capturing it. King Richard soon after defeated a detachment of Saladin's army at Ascalon in 1192, but disagreement among the soldiers prevented his army from reaching Jerusalem. However, a treaty was concluded by which the Syrian coast from Jaffa to Tyre fell into the hands of the Christians, and a truce for three years was agreed upon. Saladin soon after retired to Damascus, where he died the following year. He ranks in history among the most efficient and successful rulers of the Moslems. Besides giving encouragement to industries, he built canals, roads, and dikes. He founded cities and planned to solidify the people under his dominion. He is the most eminent Moslem of the Third Crusade and exemplifies Eastern chivalry to the highest extent. Sir Walter Scott treats the chivalrous side of Saladin in "The Talisman."

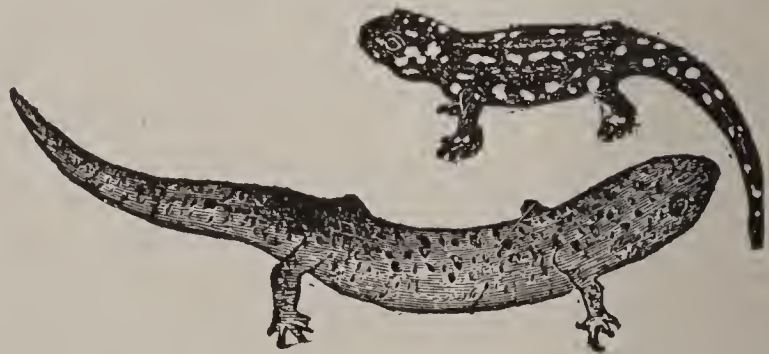
SALADO (sā-lā'thō), a river of South America, in Argentina. Its source is near the southern boundary of Bolivia, on the eastern slope of the Andes, and, after flowing toward the southeast, a distance of 950 miles, it joins the Parana at Santa Fe. The Salado flows

through a fertile region and is navigable about one-third of its course.

SALAMANCA (sāl-ā-măn'kā), a village of New York, in Cattaraugus County, sixty miles south of Buffalo. It is on the Allegheny River and the Erie, the Pennsylvania, the Buffalo, Rochester and Pittsburg, and other railroads. The surrounding country is agricultural. It has manufactures of cotton goods, gloves, furniture, and machinery. The chief buildings include the public library, the high school, and a number of churches. The vicinity was first settled in 1616 and the village was incorporated in 1878. Population, 1905, 5,435; in 1920, 9,276.

SALAMANCA (sāl-ā-măn'kā), a city of Spain, capital of the province of Salamanca, on the Tormes River, 115 miles northwest of Madrid. Once renowned for its splendid edifices and institutions, it has declined under successive wars and a lack of industry, but within recent years the city has gained materially in population. A railroad line connects it with Valladolid and other places of importance. It has manufactures of clothing, leather, chemicals, and earthenware. Among the most noted buildings are a cathedral in the Romanesque style dating from 1102, numerous other churches, several Jesuit colleges, and its great university. The university was in the height of its prosperity from the 15th to the 17th centuries and at one time had 15,000 students, but at present there are not over 1,250. The great square, designed for bullfights, was long an attraction for the sportive world and has a capacity for 20,000 spectators. Salamanca is mentioned in history as having been captured by the Carthaginians under Hannibal in 222 B. C., but later the Romans expelled the intruders and made it the center of military influence in that part of Spain. It was the scene of a battle on July 22, 1812, in which the French under Marshal Marmot were defeated by the Anglo-Portuguese under the Duke of Wellington. Population, 1920, 26,295.

SALAMANDER (sāl'ā-măn-dēr), a class of animals allied to newts, which closely resemble the lizards. Many species have been de-



RED AND SPOTTED SALAMANDERS.

scribed. All have an elongated body, a long tail, and four legs. The young are brought forth in water, where they at first breathe by gills, but later they take mostly to land and breathe by well-developed lungs. Their food

consists of snails, slugs, worms, and insects. The *spotted salamander* is a representative type. It has peculiar spots on its back and is a sluggish and stupid animal. It is common to the warm and temperate parts of Africa, Asia, and Europe, where it attains a length of about seven inches. The *black salamander* is somewhat smaller and is peculiar for exuding a milky humor from the pores of the back and sides when alarmed, as a protection against small animals. Allied species are native to the temperate and warm parts of America, but they are more frequently spoken of as newts and efts. These animals were formerly thought to possess a body so cold as to be invulnerable to fire and other forms of heat, but this view has long since been dispersed, except among the illy informed of some parts of Asia.

SALAMIS (săl'ă-mīs), or **Kuluri**, a Grecian island in the Gulf of Aegina, eight miles west of Athens. It has an area of 36 square miles. The surface is rocky and mountainous, but produces grapes, cotton, olives, and mulberry trees. Ambelaki, the chief town, occupies the site of the ancient town of Salamis. Population, 1918, 6,145.

SALAMIS, Battle of, a celebrated naval engagement between the Greeks and Persians in 480 B. C. It occurred off the island of Salamis, near Athens, which is now generally called Kuluri. The battle was fought shortly after the historic battle of Thermopylae. Xerxes commanded the Persian fleet of 1,200 triremes and a large number of smaller vessels, and the combined fleet of the Grecians numbered only 365 triremes. Two main divisions made up the Grecian army, those of the Corinthians and the Athenians. The former were commanded by Adimantus and the latter by Themistocles, but the entire Grecian force was directed by the Spartan Eurybiades. Overconfidence of the Persians and the unwieldy number of their vessels made it possible for the Grecians to charge them with great success and to protect their coast against further Persian attacks.

SAL AMMONIAC (săl ăm-mō'nī-ăk), the chloride of ammonium, obtained from the refuse matter of gas works. It is found native in volcanic regions and may be produced in small quantities by adding hydrochloric acid to a solution of ammonia. Sal ammoniac is soluble in water, has a specific gravity of 1.45, and is bitter to the taste. It is used in medicine, in galvanizing iron, and in calico printing.

SALAYER (să-lī'ēr), the name of a group of islands in the Malay Archipelago, situated a short distance south of Celebes. Salayer Island, the largest of the group, has an area of 250 square miles, while the entire area is 295 square miles. The islets included are Hog, Boneratta, and Kalaura. The group is of coral limestone formation and has a fertile soil. Tobacco, cotton, potatoes, indigo, fruits, horses, and ebony are the principal products. The inhabitants are

chiefly Malays of the Mohammedan faith. Population, 1917, 65,840.

SALEM (să'lēm), a port city of Massachusetts, county seat of Essex County, on Massachusetts Bay, fifteen miles northeast of Boston. It is on the Boston and Maine Railroad and has regular communication by steamboats and electric railways. The harbor is comparatively shallow, but has been put in a condition of improvement that renders it quite safe and convenient. It has two fine parks, the Willows and Washington Park, and is well improved by grading, paving, sewerage, waterworks, and gas and electric lighting. The noteworthy buildings include the county courthouse, the customhouse, the city hall, the State normal school, the public library, the Bertram Home for Aged Men, and the Salem Hospital. It is the seat of the Peabody Academy of Science, the Salem Athenaeum, and the Essex Institute. The manufactures include boots and shoes, cotton and woolen goods, cordage, white lead, leather, earthenware, hardware, and machinery.

Salem is a Mecca for tourists throughout the year, owing to its early history. It was founded in 1626 and the church erected by Roger Williams in 1634 may still be seen immediately back of Plummer Hall. The famous crusade against witchcraft occurred in 1692, which resulted in hanging nineteen persons on Gallows Hill and the death of another by pressure. Salem is the birthplace of Nathaniel Hawthorne, who wrote the preface to "The Scarlet Letter" in the customhouse. It was incorporated as a city in 1836. Population, 1905, 37,586; in 1920, 42,515.

SALEM, a city in New Jersey, county seat of Salem County, 38 miles southwest of Philadelphia, Pa. It is near the confluence of the Delaware and Salem rivers, on the West Jersey and Seashore Railroad. It was settled by Swedes in 1641, became a stronghold of Quakers under John Fenwick in 1675, and was incorporated as a city in 1858. Pop., 1920, 7,435.

SALEM, county seat of Forsyth County, N. C., 110 miles west of Raleigh, on the Southern and other railroads. It has manufactures of tobacco, machinery, and farming utensils. The features include the courthouse, federal building, and Salem Female College. It was settled in 1766 and incorporated in 1850. Pop., 1920, 5,583.

SALEM, a city of Ohio, in Columbiana County, seventy miles west of Pittsburg, Pa. Communication is furnished by the Pennsylvania and the Pittsburg, Lisbon and Western railroads. It is surrounded by a fertile agricultural country, which contains deposits of bituminous coal. The chief buildings include the high school, the public library, and many churches. Among the manufactures are hardware, flour, pumps, and machinery. It is improved by electric lighting, waterworks, and pavements. The place was settled in 1807 and incorporated as a city in 1887. Population, 1900, 7,582; in 1920, 10,305.

SALEM, the capital of Oregon, county seat

of Marion County, on the Willamette River, 52 miles south of Portland. It is on the Southern Pacific Railroad and is surrounded by a fertile agricultural and dairying country. Much has been done to improve and beautify the site, which rises gradually from the margin of the river. The noteworthy buildings are the State capitol, the county courthouse, the Federal building, the city hall, the opera house, the high school, the State prison, the State insane asylum, and the State school for the deaf. It is the seat of the Willamette University, the Friends' Institute, the Academy of the Sacred Heart, and the Indian Training School. This city is well improved by electric lighting, waterworks, sewerage, and grading. Among the manufactures are linseed oil, leather, woolen goods, clothing, flour, furniture, tobacco, machinery, canned and dried fruits, and earthenware. The first settlement was made at Salem in 1834, but it was not platted until 1844, and it became the State capital in 1860. Population, 1920, 17,679.

SALEM, a city of India, in the Madras presidency, about 125 miles southwest of Madras, with which it is connected by railways. It is the capital of a government of the same name. It has a number of noteworthy temples, government buildings, and educational institutions. Among the manufactures are carpets, clothing, hardware, earthenware, and machinery. Modern improvements, such as telephones, pavements, electric lights, and waterworks, have been constructed. The surrounding districts produce large quantities of rice, pulse, and fruits. Population, 1916, 72,812.

SALERNO (să-lēr'nō), a seaport city of southern Italy, on the Gulf of Salerno, 32 miles southeast of Naples, with which it is connected by a railroad. It is surrounded by a stone wall of Gothic structure, but has an unimportant harbor and few modern conveniences. The streets are mostly narrow and in a poor state of repair. It has a number of excellent buildings, including a beautiful Gothic cathedral erected by the Normans, several baths, and a number of celebrated sepulchers. The famous University of Salerno was founded in 1150, but was abolished in 1817. Salerno has improved materially since its railroad line was built and has manufactures of silk and cotton textiles, earthenware, and utensils. The province of Salerno, of which the city of Salerno is the capital, is noted for its production of fruits and wine. Population, 1916, 43,871.

SALFORD (səl'fōrd), a town in England. See **Manchester**.

SALIC LAW (săl'ik), the code of laws established by the Salian Franks. The name is applied particularly to one chapter of these laws, that in which succession to certain lands is limited to male heirs to the exclusion of females, chiefly because the possession of those lands implied certain military duties. The Salic Law was applied in France to the succession of the crown

in the 14th century, thus excluding females from the throne.

SALICYLIC ACID (săl-ĭ-sĭl'ik), an organic acid found in many plants, but the best quality is obtained from wintergreen, in which it forms an essential oil. It is a compound of carbon, hydrogen, and oxygen and is obtained by distilling the flowers of some plants and the bark of others. It is found in combination with the volatile oil of betula in the bark of the sweet birch, in the flowers of the meadowsweet, and in the whortleberry. The taste is sweetish-sour and the properties are antiseptic and antiputrefactive. For commercial purposes it is manufactured either from the oil of wintergreen or from carbolic acid, but the latter is the most important product. It is used in the manufacture of certain dyestuffs, for the preservation of articles of food, and in some cases as a medicine. The foods preserved by this product include milk, eggs, fruits, and pickled vegetables. Antiseptic properties are not possessed by the salts of salicylic acid, but its sodium salt is used for medicine, especially in cases of acute rheumatism.

SALINA (să-lĭ'nā), a city in Kansas, county seat of Saline County, on the Smoky Hill River, 38 miles northeast of Ellsworth. It is on the Missouri Pacific, the Union Pacific, the Atchison, Topeka and Santa Fé, and the Chicago, Rock Island and Pacific railroads. Gypsum quarries and salt springs are found in the vicinity. The surrounding country is fertile, producing cereals, grasses, and fruits. Among the principal buildings are the county courthouse, the public library, the Federal building, the Kansas Wesleyan University, and the Salina Normal University. The manufactures include flour, brooms, vehicles, ironware, and machinery. The city has electric lights and other municipal facilities. It has a growing trade in live stock and cereals. The place was settled in 1860 and incorporated in 1870. Population, 1920, 15,085.

SALISBURY (səl'z'bēr-ĭ), or **New Sarum**, a city of England, in Wiltshire, on the Avon River, eighty miles southwest of London. It has convenient railroad facilities, manufactures of cutlery and clothing, and several public schools. A splendid cathedral, completed in 1258, is its chief building. It is 473 feet long and 111 feet wide, and has a spire 400 feet high. Salisbury has a fine bishop's palace and the Blackmore Museum, the latter containing antiquities collected in America. Among the manufactures are cutlery and clothing. Population, 1917, 18,866.

SALISBURY, a city in North Carolina, county seat of Rowan County, on the Southern Railroad, 115 miles west of Raleigh. It is surrounded by a fertile region, which produces cereals, tobacco, cotton, and fruits. The features include the county courthouse, the State normal school, the Livingstone College, the National Cemetery, and many churches. It has extensive shops of the Southern Railroad. Among the

manufactures are cigars, flour, ironware, railroad cars, and machinery. It was incorporated in 1770. A Confederate military prison was located here at the time of the Civil War. Population, 1900, 6,277; in 1920, 13,884.

SALISBURY, Robert Arthur, Marquis of, statesman, born in Hatfield, England, Feb. 3, 1830; died Aug. 22, 1903. He studied at Oxford



ROBERT A. SALISBURY.

University, where he completed a course by graduation. In 1853 he entered Parliament for Stamford as a Conservative and in 1868 was created a marquis. He was known as Lord Robert Cecil in the House of Commons until

1865, when he assumed the title of Viscount Cranborne. In 1866 he became Secretary for India, a position he resigned in 1867, but was again appointed in 1874, and in 1878 he was made Secretary of Foreign Affairs. In the same year he and the Earl of Beaconsfield attended the Congress of Berlin as representatives from Great Britain. His party sustained a defeat in the election of 1880, but he succeeded Lord Beaconsfield as leader of his party in the House of Lords, and as such opposed Gladstone's Egyptian policy. When the government of Gladstone fell, in 1885, Salisbury succeeded him as Premier, but resigned in the same year and was again elected in 1886. The Conservatives were defeated in the general election of 1892, when he resigned, but with the success of that party in 1895 he again came into power. He was married to Georgina Alderson in 1857, a lady of considerable ability and influence, who died Nov. 20, 1899. Salisbury became chancellor of the University of Oxford in 1869 and was otherwise accorded distinguished honors.

SALIVA (să-lí'vā), the thin, colorless liquid secreted in the mouth by the salivary glands, which serves to keep the mouth in a moist condition and aids mastication by mixing with the food. Three pairs of salivary glands secrete saliva, known as the parotid, submaxillary, and sublingual. The *parotid glands* are seated on the sides of the face, between the ear and the lower jaw; the *submaxillary*, beneath the horizontal part of the lower jaw; and the *sublingual*, beneath the tongue. They consist of numerous lobes and lobules, which are connected by vessels, ducts, and areolar tissue. The product secreted is conducted to the mouth by ducts. The amount varies, but the usual quantity is about three pounds per day, and in health it is always sufficient to keep the mouth moist. It contains but a small proportion of solids. Besides serving to moisten the food, it assists in

mastication and swallowing, and its peculiar organic principle, called *ptyalin*, acting upon the starch of the food, begins the process of changing it into glucose or grape sugar. Some mammals are destitute of salivary glands, and so also are some reptiles and most fishes.

SALLEE (să-lě'), or **Sla**, a seaport town of Morocco, on the Atlantic coast, at the mouth of the Bu-Regreb, 100 miles west of Fez. It occupies a site on the north side of the river, opposite the town of Rabat, and has manufactures of carpets, textiles, and utensils. Its importance is due to a considerable export trade in wool and fruits. It was long a haunt for pirates, but piracy was stopped by European powers in the early part of the last century, although Rabat was bombarded by the French in 1851. Sallee has a population of 12,125, of which about 3,000 are Jewish traders.

SALLUST (săl'lüst), **Caius Sallustius Crispus**, eminent Roman historian, born at Amiternum, in the Sabine country, in 86 B. C.; died four years before the Battle of Actium, in 34 B. C. He descended from a plebeian family closely connected with the Sabines, but after securing a liberal education rose rapidly to official distinction. In 59 B. C. he was made quaestor and became a tribune of the people in 52 B. C., casting his fortune on the side of Julius Caesar. He was elected praetor in 46 B. C. and soon after accompanied the latter on his campaign into Africa, where he was made governor of Numidia. His administration was oppressive. He enriched himself with such greed that he was accused before Caesar, but escaped being brought to trial.

After returning to Rome, Sallust built vast improvements and gardens on the Quirinal, where he lived the remainder of his life and occupied himself in historical research. His writings are remarkable for their vivid portrayal of character and because they are written in an excellent literary style. They contain many suggestions and accounts of value in military science and geography. The principal works include "Bellum Catilinarium," a descriptive history of Cataline's conspiracy, and "Jugurtha," or "Bellum Jugurthinum," a history of the war against the Numidian king Jugurtha from 111 to 106 B. C. His "Historiarum Libri V." is a treatise of public events from 78 to 66 B. C. Several other historical works have been attributed to him, but they are of doubtful authenticity.

SALMON (săm'ŭn), the common name of a class of food fishes which belongs to the genus *Salmo*. They are common to both salt and fresh waters and are particularly abundant in the North Atlantic. A number of well-marked species have been described, all of which are among the most important marketable fishes, but those of the North Atlantic are most widely distributed, ranging north of New York in America and north of Spain in Europe. The usual length of the common salmon is from three to four feet

and the general weight ranges from 15 to 30 pounds, but specimens weighing 50 and even 75 pounds are not rare. The color of the adult fish is a steel-blue on the back and head, variegated with grayish or blackish spots, and merging into silvery-white beneath. The flesh has a delicate reddish-orange color. It feeds on animal matter, particularly on minnows, small fish, and herring, but its food varies somewhat with the locality which it frequents. The salmon cannot be said to belong exclusively to either the marine or the fresh-water fishes, but its natural home is near the mouths and estuaries of the larger rivers. However, there are marine species that



SALMON.

1, Salmon Trout; 2, Columbia River Salmon.

inhabit the deeper parts of the ocean and a species occurs landlocked in certain lakes in Maine, New York, and New Brunswick.

It is thought that the salmon obeys a natural instinct in migrating from the sea to spawn in the rivers. This migration occurs annually in the autumn, and, after remaining for some weeks in the stream, both male and female return to the sea. This migratory instinct is so great that rapids and waterfalls are no material obstacle against its advance toward the heads of rivers. Salmon have been seen to leap a height of sixteen feet and, failing to surmount the difficulty, successive trials have been observed. They possess a peculiar ability to suspend themselves and move upward in the falling water by a switch of the tail. The eggs are deposited in furrows made by the female in the gravel lying at the bed of the river, where they are covered by sand moved by means of the tail. Many of the eggs are carried away by the running water or eaten by trout and wild fowl, but these losses are compensated for by the immense fertility of the fish, many hundreds of eggs being deposited by a single female. The eggs hatch in a period ranging from 70 to 140 days. The young fish in its embryo state resembles a tadpole, being only about five-eighths of an inch in length and having a portion of the egg suspended below its body, which serves as food for several weeks. By the seventh week it has grown sufficiently to assume the form of a small fish an inch in

length, and it begins to swim about in search of food.

The young salmon before its migration seaward is called a *parr*. In that stage it ranges from three to eight inches in length. When from one to two years old, it begins to assume a brilliant silvery hue and the fins become darker. It is now called a *smolt*, or *salmon fry*, gathers in groups of from 40 to 75, and begins to move slowly toward the sea. On reaching brackish water, the salmon remain at rest for a short time, but soon take to the sea, where their life is unknown. It has been observed that their growth in the open sea is remarkably rapid. A

molt weighing two ounces has been found to attain a weight of from six to ten pounds within a few months. After remaining about three months in the open sea, they return to fresh water weighing from four to six pounds and are known as *grilse*, or *salmon peel*. They are capable of depositing eggs when in the grilse state and usually spawn shortly after reaching fresh water, but return soon after to the open sea to develop into the adult salmon. After a second stay in the ocean, ranging usually a period of several months, the salmon return to the fresh water, generally seeking the place of their birth. It is while they move from the sea to the spawning grounds that they are caught in large numbers.

Many methods are used to catch salmon, including by seines, gill nets, and various trap contrivances. *Gill nets* contain meshes large enough to admit the head of the fish beyond the gills, but are not large enough for the fish to pass through, and when trying to escape they are held fast by the gills. *Seines* are drawn through the water, but in many places the *pound net* has taken their place. It is a net that may be set in the water, the fish being guided into it as they move up stream by a straight stretch of upright nets. Fish traps are stationary structures into which the fish are guided and caught. It is not difficult to understand that these devices may be used effectually, since in many streams the salmon force their way to the upper waters in such large numbers that the streams become almost choked. The Columbia, Sacramento, and Frazer rivers are among the most prolific sources of salmon in America, the catch in the Columbia River alone being about 1,500,000 salmon annually. Salmon fisheries of vast value were added to the United States by the purchase of Alaska.

The annual catch of salmon on the entire Pacific coast of the United States and the Dominion of Canada is valued at about \$12,500,000. There is danger that the supply will be exhausted in the course of time unless the rivers are replenished by the fish commissions. Salmon fisheries of importance are found in the Elbe, Tay, and many other rivers of Europe north of Spain. The salmon common to the North At-

lantic is generally known as *salmon salar*, and differs from the species found in the waters of Northwestern America. The salmon of North America include species known as *dog salmon*, *quinnat* or *king salmon*, *silver salmon*, *blueback salmon*, *humpback salmon*, and *salmon trout* or *steelhead*. The salmon is eaten fresh and in a cured state, but in many regions the canned salmon are consumed most extensively.

SALMON TROUT. See **Trout**.

SALOL (säl'öl), a white crystalline powder used as a medicine, frequently called *salicylate of phenol*. It is tasteless and odorless, is insoluble in water, but is soluble in ether, alcohol, and chloroform. It does not dissolve when taken into the stomach, but is dissolved in the duodenum by the alkaline pancreatic juice. As a medicine it is useful in treating rheumatism. It is prescribed as an intestinal antiseptic in cholera and other disorders of the alimentary canal.

SALON (sà-lôn'), the name of an annual exhibition of works of art in Paris, France, in the months of May and June. It is held in the Palais de l'Industrie and is open to living artists of all nationalities. The exhibits consist of engravings, etchings, paintings, pastels, sculpture, and water colors. When the works of art are received at the Salon, they are examined by a jury of experts to determine whether they are worthy of being exhibited. The same jury determines the distribution of medals and the *Prix de Rome*, which is held in high esteem. This institution dates from 1607, when exhibitions began to be made at the Palais Royal, but two years later it was transferred to the Salon of Carre of the Louvre. It was transferred to its present quarters in 1855.

SALONICA (sä-lō-ně'kà), or **Saloniki**, a seaport of southern Europe, on the Gulf of Salonica. It occupies a beautiful site at the head of the gulf, which furnishes a safe and commodious harbor, but the streets are in a poor state of repair and many of them are crooked and narrow. Salonica has railroad connections with cities lying toward the north, which, together with its extensive steamboat lines, give the city an important interior and foreign trade. The trade is chiefly in cotton and woolen fabrics, grain, timber, tobacco, sponges, carpets, live stock, and fruits. Among the manufactures are cotton textiles, woolen and silk goods, clothing, utensils, leather, carpets, and machinery. The principal buildings include a number of mosques, the Christian churches of Saint George, Saint Sophia, and Saint Demetrius, and a number of government offices. Among its ancient buildings is the citadel, situated on a rocky eminence, and in it are the remains of a triumphal arch dating from the time of Marcus Aurelius. Remains of a Grecian hippodrome and Roman triumphal arches have been described by several writers.

Salonica was first known as Therma and is mentioned under that name in connection with the invasion of Greece by Xerxes. Cassander

rebuilt it in 315 B. C. and named it Thessalonica, from which the present name was derived. It was the scene of many important military maneuvers throughout the early history of Europe. In 409 the Saracens conquered it after an extended siege. It was possessed by the Normans in 1185 and taken by the Turks in 1430. At present the inhabitants consist of Spaniards, Jews, Greeks, Turks, and Albanians. Population, 1914, 161,282.

SALT, in chemistry, an acid whose hydrogen has been partly or wholly replaced by metal, as sodium chloride; or a compound formed by the union of an acid and a base, as nitrate of silver. The term is applied in a plural form to compounds that can suffer rapid double decomposition with another soluble substance. This is the case when mixing together solutions of nitrate of silver and chloride of sodium, which at once decompose each other and form nitrate of silver and chloride of sodium. The term is often applied to various compounds, such as acetate of ethyl, chloride of ethyl, and even to such fats as stearin and glycerin. In popular usage, the term salts refers to *Epsom salts*, a saline purgative.

SALT, or **Chloride of Sodium**, a widely distributed compound, which has been used for seasoning and as a preserver of food from time immemorial. It is an essential ingredient of food for most animals and supplies the chief source of soda and chlorine. Hence, it enters extensively into the market and forms an important product for many uses in chemical and industrial arts. About 3 per cent. by weight of the ocean is made up of it, and vast beds of salt occur in strata of all geological periods from the Silurian up. Extensive deposits of salt are found widely distributed in all the continents. Wild animals obtain it at salt licks, to which they tread trails or paths. Traces of trails may be seen in many sections of North America, especially in the arid regions, most of which were made by elks and bison. The salt of the market is obtained by evaporating or freezing water taken from the ocean, or by mining in beds of rock salt. In many regions it is obtained from the waters of saline lakes, springs, and wells. Brine springs result from rock salt dissolving under the influence of subterranean streams, notable instances of this occurring in Kansas, Oklahoma, and other sections of the United States. Michigan has remarkable deposits of salt, particularly in the vicinity of Saginaw Bay. Commercial salt also is obtained by evaporating water taken from the ocean.

Vast deposits of salt occur in the Avery Island region of Louisiana. Here the salt strata are reached at a depth of 250 feet below the surface. It is estimated that these deposits have a thickness of about 2,000 feet. Vast deposits of salt occur in Nevada and California, where valuable strata of rock salt, brine springs, and saline marshes are abundant. The most celebrated salt

deposits of Europe are in Prussia, where mines have been worked continuously since the 12th century. Other notable deposits occur in the Crimea, Caucasus, China, Persia, the Sahara Desert, and various parts of Australia. In many arid countries, as in parts of Australia, Asia, and the western sections of North and South America, salt lakes are abundant. In the rainy seasons the lake basins are supplied with an abundance of water, but during the dry times vast deposits of salt form near the shore by the evaporation of the water.

The United States exceeds every other country in the world in the production of salt. At present the annual output is about 3,150,700 tons. It represents a value of \$8,150,000. Much of it is exported to Canada, Mexico, Central America, and the Hawaiian Islands. Canada has vast deposits of salt, especially in the vicinity of Goderich, Ontario, but the annual output does not exceed 80,000 barrels. Besides serving as a preserver and seasoner of food, salt is used as a general mordant, for glazing coarse pottery, in giving hardness to soaps, and for imparting clearness to glass.

SALTILLO (sâl-têl'yô), a city of Mexico, capital of the state of Coahuila, 65 miles southwest of Monterey. It occupies a fine site in the fertile valley of the Rio Tigre, has well-paved streets and several public buildings, and is a railroad center of considerable importance. Among the manufactures are cotton and woolen goods, clothing, and machinery. It was founded in 1586. Near it was fought the Battle of Buena Vista, in 1847. Population, 1920, 35,063.

SALT LAKE CITY, the capital of Utah, county seat of Salt Lake County, near the Jordan River, ten miles southeast of Great Salt Lake. It has transportation facilities by the Union Pacific, the Utah Central, the Rio Grande Western, and other railroads.

DESCRIPTION. The city is beautifully situated at the western base of the Wasatch Mountains and has a general altitude of 4,250 feet above sea level. It is regularly platted, the streets crossing each other at right angles, and the thoroughfares are wide and well graded. Many of the streets are well paved with stone, asphalt, and macadam and a small stream of water runs next to the curb of most of the paved streets. Extensive systems of electric lighting, waterworks, and electric railways are maintained. Electric power is developed by a cataract in a mountain some distance from the city, both for lighting and industrial enterprises. The street railways reach all parts of the city and many suburban and interurban points. In the vicinity of Salt Lake are hot sulphur springs, and bathing resorts are maintained on the shores of Great Salt Lake. The most popular bathing places are at Saltair and Garfield Beach, both of which are finely improved and attract large numbers of visitors and tourists.

BUILDINGS. Temple Block, near the heart of

the city, contains the celebrated Mormon Temple, the Tabernacle, and the Assembly Hall. This tract consists of about ten acres, and here the Mormon Church has its official seat and headquarters. The Mormon Temple, which is the most beautiful and costly building in the city, was completed in 1892. It was formally dedicated on April 6, 1893, that being the 63d anniversary of the Mormon Church. Forty years were required to complete the structure and the total cost, estimated in value of material and labor at the time, was \$12,000,000. It is of granite, 187 feet long and 99 feet wide, and each end has three lofty towers, the highest of which is 223 feet above the foundation. The highest spire is surmounted by a statue of the angel Maroni, which is 12 feet in height and finished with gold-leafed plating. The Tabernacle is elliptical in form, 250 feet long and 150 feet wide, and has accommodations for 10,000 persons. It has self-supporting arches in the roof, which is 70 feet high, and is noted for its superb acoustic properties. The great organ in this structure is considered one of the finest in America. Several other buildings connected with the Mormon Church are of interest, including the tithing storehouses, the former residences of Brigham Young, and the Latter Day Saints' College. A monument surmounted by a statue of Brigham Young stands in front of the Temple Block.

Among the principal public buildings are those of the city and county, the Exposition Building, the Salt Lake Theater, and the Holy Cross and the Saint Mark's hospitals. The University of Utah, a coeducational institution, is maintained by State support. It is situated on the site of Fort Douglas, which was granted by Congress in 1893. The city has a State normal school and many private institutions, including Gordon Academy, All Hallow's College, Rowland Hall, and Salt Lake Collegiate Institute. All of the leading Christian denominations are well represented by organizations and many fine church buildings are maintained. The public library contains 25,000 volumes and other collections of books are in the educational institutions and in the State law library, which has 15,000 volumes.

INDUSTRIES. The city has extensive interests in jobbing and wholesaling and is the most important commercial city between Denver and the Pacific coast. Several smelters and mineral mills are operated. It is the headquarters of a number of large mining companies that operate in the vicinity. It has a large trade in live stock and farm products, although irrigation is necessary to maintain the productiveness of the country. Among the leading manufactures are saddlery, boots and shoes, malt and spirituous liquors, pipe tobacco and cigars, furniture, machinery, and railway cars.

HISTORY. Brigham Young founded Salt Lake City in 1847, at which time the region was far from settlements and was noted as an arid and

waste country. Under the persevering influence and industry of the early settlers the region was transformed into a district of fertility and wealth, and the city ranks among the most beautiful and prosperous in the United States. The organization as a city dates from 1851. After gold and silver were discovered in the vicinity, a large number of non-Mormons settled here, and this class now constitutes about one-third of the inhabitants. Population, 1920, 118,110.

SALTON SEA, an extensive body of water in the southwestern part of California, located a short distance northwest from the Gulf of California. The basin is about 200 feet below sea level and the water covers an area of 500 square miles, located within what is known as Imperial Valley. It is thought that the basin was once occupied by the water of the Gulf of California, but in recent times it has been quite dry. In the summer of 1891 the Colorado River became unusually high, causing an overflow to find its way into the basin. American capitalists undertook to irrigate the district by waters from the river in 1900, and the river, from which there is considerable fall, cut the irrigating canal to the extent that the waters became uncontrollable. In 1905 a large section of country was inundated and the Salton Sea was over 70 feet deep in some places. Many millions of dollars' worth of property were destroyed by this flood, which was finally stopped in 1907. Large deposits of salt abound in the basin, hence the fresh water of the river became salty in the basin.

SALTPETER (salt-pē'tēr), or **Nitre**, a white crystalline substance, which has a saline taste. It is obtained by leaching from certain soils, in which it is produced by the process of nitrification, a method of oxidation in which nitrogenous vegetable and animal matter, in the presence of air, moisture, and some alkaline basic substances, is converted into nitrates. Native deposits of saltpeter occur in India, Persia, and other countries of Asia, but the commercial supply is now prepared largely from the deposits of nitrate of soda found in Chile and Peru. In preparing it a double decomposition is effected between nitrate of soda and either potassium chloride or potassium carbonate. Solutions of the two substances are mixed in a boiling state and the sodium chloride or carbonate is formed. Being much less soluble in boiling water than the saltpeter, or potassium nitrate, it may be readily separated. Saltpeter crystallizes in six-sided prisms. It is used with common salt and sugar in curing meat, as an oxidizing agent, in glass making, in metallurgical operations, in the manufacture of gunpowder, and in pyrotechnics. It has an important place in pharmacy. Native nitrate of soda is valuable as a fertilizing manure, for which purpose largely quantities are shipped from Chile and other South American ports.

SALTS, the name of many compounds formed by the action of acids upon bases, in

which one atom of a univalent element is substituted for one atom of hydrogen. These salts include potassium nitrate, sodium chloride, and silver chloride. Other salts are formed by the substitution of one atom of a bivalent basic forming element for two atoms of hydrogen, such as zinc chloride and barium nitrate. The list includes a large number of acid salts, such as sulphate of iron or green vitriol, which is formed by the union of sulphuric acid and iron.

The name *smelling salts* is applied to a preparation of carbonate of ammonia with fragrant volatile oils. Products of this kind are used to diffuse sweet scents, or to restore persons who suffer from faintness. They rely for their pungency upon ammonia, while the agreeable scents are derived from various oils, such as the oils of cloves, lemon, bergamot, and lavender. Fancy bottles are manufactured to contain these products and they are usually ornamented with silver and gold decorations.

SALTUS (sāl'tūs), **Egar Evertson**, author, born in New York City, June 8, 1858. He completed a course in Saint Paul's School at Concord, N. H., and later attended the Sorbonne and the universities of Munich and Heidelberg. In 1880 he graduated from the Columbia Law School, and soon after turned his attention to literary work. His chief publications embrace works of fiction, though he also wrote on biographical and philosophical topics. Among his publications are "Anatomy of Negation," "Philosophy of Disenchantment," "When Dreams Come True," "Truth About Tristrem Varick," "A Transaction in Hearts," "A Story Without a Name," "Imperial Purple," and "The Pace that Kills." His brother, Francis Saltus Saltus (1849-1889), wrote "Honey and Gall" and a number of volumes of poetry.

SALTZMANN (zälts'män), **Karl**, painter, born at Berlin, Germany, in 1847. He studied in his native city and at the University of Düsseldorf, and subsequently traveled in Southern Europe to inspect art galleries. His first works to attract general attention were "Views of the Coast" and "Harbors of Holland," which have since been placed in the collection of the Emperor of Germany. From 1878 to 1880 he accompanied Prince Henry on a trip around the world. He was made instructor of the Berlin Academy in 1894, and was given a number of awards and medals for excellence in painting. His chief works include "In the Pacific Ocean," "Entrance to the Harbor of Kolberg," "Sailing Vessel in Drift-ice," "Surrender of Danish Ships at Eckernförde," and "Opening of Kaiser Wilhelm Canal."

SALVADOR (säl-vā-dōr'), **Republic of**, the smallest of the Central American states, which is situated southwest of Honduras. It is 140 miles long from east to west and has an area of 8,135 square miles. Much of the surface is gently undulating, but there are ranges of volcanic mountains traversing through the central part, with

peaks ranging from 3,500 to 9,000 feet above sea level.

DESCRIPTION. The Pacific coast is a generally level plain, from which valleys extend along the streams to the boundary of Honduras and Guatemala, and a considerable valley region extends through the northern part. The western boundary is formed by the Santiago River and along the southeastern coast is the Gulf of Fonseca, a large inlet from the Pacific. A large part of the general drainage is toward the south. The chief river is the Lempa, which is navigable a short distance, and the principal inlet is Jiquilisco Bay. The soil is remarkable for its fertility.

INDUSTRIES. The climate and rainfall are favorable to the production of cereals, grasses, fruits, and vegetables. Agriculture is the chief industry, but comparatively large interests are vested in mining. Among the chief products are sugar, coffee, indigo, tobacco, balsam, maize, cotton, and timber. The mineral deposits include gold, silver, iron, copper, mercury, and coal. Cattle, horses, mules, and sheep are reared in abundance. The manufacturing industries are in a primitive state, but the country has the elements that permit development, since the natural resources supply an abundance of material to render manufacturing enterprises profitable. Among the leading manufactures are flour, indigo, sugar, balsam, and rum. A majority of the trade is with Great Britain and the United States.

GOVERNMENT. Salvador is divided into fourteen departments and the government is modeled after that of the United States. The president is elected for a term of four years and has the assistance of a cabinet of four departments. Legislative authority is vested in a congress of seventy representatives, elected by popular vote for terms of one year, and the judicial power is vested in a supreme court and a system of inferior courts. The standing army numbers about 4,250, but it is not well equipped, and the national militia is placed at 18,000 men and officers. The navy is not of material importance, including only a few ships and gunboats. Education is free and attendance at school is nominally obligatory. Besides the elementary schools, there are high schools in the towns and cities, two normal schools, and a national university with faculties of law, medicine, sciences, and engineering.

GENERAL. In 1917 the country had 280 miles of railroads. Some of the highways are well built and several canals are maintained. Spanish is the spoken and official language. Roman Catholicism is the state religion, but other denominations are tolerated. Salvador is the capital and largest city. Other cities include Santa Ana, San Miguel, Nueva San Salvador, San Vicente, and Sonsonate. A large proportion of the inhabitants are natives and mixed races, 234,648 of the former and 772,200 of the latter. Population, 1915, 1,268,692.

HISTORY. Salvador was long known as Cus-

catlan. It was conquered for Spain by Pedro de Alvarado in 1525. It became independent from that country in 1821, when it joined the Mexican confederation, but became an independent republic in 1853. The present constitution was adopted in 1864, but it has since been revised several times. Salvador is the most densely populated republic of Central America, but its material progress has been retarded considerably by local dissensions and revolutions. The people have generally opposed the proposition to form a union of the Central American states.

SALVATION ARMY, an organization formed in England by William Booth in 1865, whose mission is the salvation of mankind by spreading the Gospel. In this work he was assisted by his wife, both of whom had formerly been members of the Methodist New Connection. After conducting a mission in the eastern part of London, at which many depraved persons were changed into earnest converts, the mission was reorganized and called the Salvation Army, and by this name it has been known since 1878. Military phrases were generally adopted, the leader being called a *general*; evangelists, *officers* of different grades; and candidates, *cadets*. The uniforms differ according to the customs of a country, but are quite similar in the United States, Australia, and the countries of Europe, while in parts of Asia red or white garments are most prevalent. Everywhere the army prepares a map on which the country is represented in districts and each section is placed under the charge of a *major*. This officer is assisted by one or more corps under a *captain*, who is assisted by *lieutenants*.

The army was equally applauded and opposed from the first, but in its quiet way it has won a large following, everywhere practicing self-denial and coming in touch with the common people. Both men and women wear characteristic uniforms, the latter being distinguished principally by poke bonnets with red trimmings, and in this manner parade the streets with banners, drums, timbrels, and songs. Crowds are induced to assemble at convenient places, and after a brief service the parade is conducted by the leader to the church or hall, where the services are continued. Members are pledged to temperance, unselfish lives, and belief in the Bible, and each is encouraged to give glad obedience and lead a spiritual, enthusiastic, Christian life. No distinction is recognized between the sexes as to rank, duty, or opportunity, and all persons are welcome to membership with a spirit of good cheer and devotion.

The army made its first appearance in France in 1880 and in the same year began its crusade in Canada and the United States. Ballington Booth took charge of the American branch in 1883, but in 1896 organized a separate society known as *The Volunteers*. Booth-Tucker is at present the commander of the Salvation Army in North America. The army has 775 stations

on this continent, 3,250 officers, 25,000 active workers, and about 425,000 members. It maintains 150 relief stations and a number of educational institutions. The total membership in the world is growing rapidly and the work is conducted in about 35 different languages. The *War Cry* is its principal publication. It is issued in England, but there are editions in French, German, and Swedish in New York City. Other periodicals include *The Young Soldier*, *Conqueror*, *Harbor Lights*, and *Social News*. General Booth published his "In Darkest England and the Way Out" in 1890. The organization rendered valuable service throughout the Great European War both in the camps and the hospitals.

SALVINI (sàl-vē'nē), **Tommaso**, tragedian, born in Milan, Italy, Jan. 1, 1830; died Jan. 1, 1916. He studied in Milan and, after securing a liberal education, became connected with the Royal Theater, at Naples. In 1849 he took part in the Italian Revolution, but soon after resumed stage life. His greatest success was attained on the 600th anniversary of Dante's birth, which was celebrated at Florence in 1865, when he took the part of *Lancelotto* in the tragedy, "Francesca di Rimini." He visited the United States in 1875 and in 1881, and both times obtained remarkable success. It may be said that his success rested on his perfect elocution and dramatic power, but these were reënforced by noble bearing and his splendid physique. He retired from the stage in 1884 to take up his residence in Florence. His chief parts were *Saul*, *Hamlet*, *Orosmane*, and *Othello*. King Victor Emmanuel conferred upon him the honor of knighthood. His son, Alexander Salvini (1861-1896), is likewise noted as an actor.

SALWIN (sàl-wēn') or **Salween**, a river of Asia, rises in Central Tibet and, after a general course of 800 miles toward the east and south, flows into the Gulf of Martaban, an inlet from the Indian Ocean. Several lakes are in the upper course, but in some places it flows through steep cliffs, and the valley has much fertility. Rapids obstruct navigation, but steamboats ascend as far as Moulmein, to which place large quantities of teak and other timber are floated. The basin of the Salwin includes 62,750 square miles.

SALZBURG (zàlts'bōrg), a city of southern Austria, in the province of Salzburg, on the Salzach River, 62 miles southeast of Munich, Germany. It occupies a beautiful site on both sides of the river, which is crossed by several bridges. It has railroad conveniences and communication by electric railways. Among the buildings of note is the Castle of Hohen-Salzburg, a fine structure dating from the 11th century. During the Middle Ages it was the seat of archbishops, who held the rank of princes of the German Empire. Salzburg has a fine cathedral, numerous hospitals and educational institutions, and a statue of Mozart, who was born here. The manufactures include musical instruments, clothing, pottery, and machinery.

The surrounding country is highly fertile and the city is one of the most beautiful in Europe. It has belonged to Austria since 1814. Population, 1920, 36,210.

SÁMAR (să'mär), an island of the Philippines, situated southeast of Luzón, from which it is separated by the Saint Bernardino Strait. It has an area of 5,800 square miles. The coast line is indented by many gulfs and bays and the surface is more or less mountainous. The soil is remarkable for its productive fertility. It has vast forests of valuable timber and mineral deposits of considerable value. Horses, cattle, and swine are reared in abundance. Among the principal products are timber, palm oil, rice, tobacco, hemp, cocoa, and fruits. Catbalogan, population 6,072, is the capital. Population, 1918, 198,836.

SAMARA (sà-mä'rà), a city of southeastern Russia, capital of the government of Samara, at the confluence of the Samara and Volga rivers. It has an important river and railroad trade with Russian and foreign cities. Among the manufactures are soap, leather, machinery, clothing, and spirituous liquors. The noteworthy buildings include a government house and many fine schools. It is one of the chief grain markets on the Volga and has a large trade in live stock, fish, tallow, and salt. Electric railways, pavements, and waterworks are among the improvements. It was founded as a fort in 1586. Population, 1916, 98,645.

SAMARANG (sà-mà-räng'), a seaport of Java, on the northern shore, 380 miles southeast of Batavia. It is the third city of the island in population and commercial importance. The city has a good harbor, which has been improved by the construction of docks and wharves. It is the seat of a growing trade in coffee, tobacco, rice, sugar, indigo, and fruits. A railroad line has been built inland. The inhabitants consist largely of Malays, Arabians, and Chinese, but it has a fair proportion of European business and professional men, who maintain churches, schools, and several institutions of higher learning. The part of the city occupied by the Europeans has well-improved streets and modern facilities. Population, 1916, 93,244.

SAMARIA (sà-mā'rī-à), an ancient city of Palestine, the capital of Israel from the time of Omri to the fall of the kingdom. It occupied a steep hill, called Shomeron, in the center of Palestine, and was so named because the hill forming the site resembled a watch mountain. We read in the I Kings, xvi., 23-24, "And he (Omri) bought the hill Samaria of Shemer for two talents of silver, and built on the hill, and called the name of the city which he built, after the name of Shemer, owner of the hill, Samaria." It is thought the purchase was made in 925 B. C., when Samaria became the seat of government. It was unsuccessfully besieged by the Syrians in 872 B. C., but Shalmaneser, King of Assyria, captured it in 721 B. C., after a siege of

three years. About that time Sargon succeeded Shalmaneser and carried the Hebrews into Babylonian captivity, while their own lands were occupied by colonists from Assyria.

From the Jews remaining in Samaria and the Assyrian colonists descended the Samaritans, a powerful religious sect. Though embracing the religion of Israel, they were refused permission to aid in rebuilding the temple at Jerusalem, and accordingly built a rival temple on Mount Gerizim in 409 B. C. Henceforth the two classes were at enmity with each other, which ultimately ended in a war and the destruction of Samaria under John Hyrcanus, a Jewish leader, in 109 B. C. It was made a Roman colony in the 3d century, but declined after the Mohammedan conquest, and on its site is the small village of Sebustieh. The Samaritans still exist as a religious sect, but differ from the Jews in that they reject the traditions and hold only to the Pentateuch, of which they possess their own version.

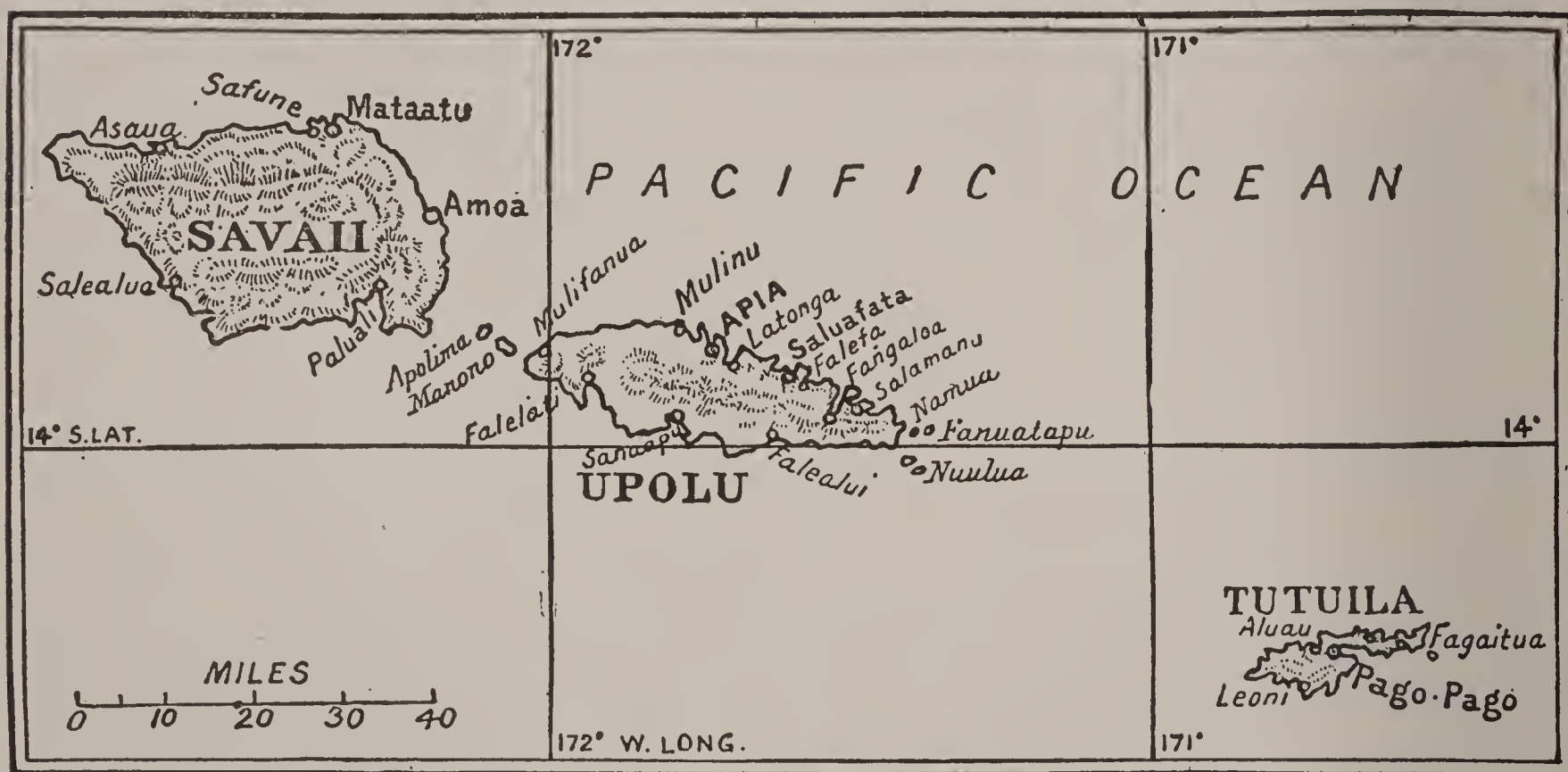
SAMARITANS. See **Samaria**.

SAMARKAND (sām-ār-kānt'), or **Samarcand**, a city of Asiatic Russia, in western

the capital of the great empire of Tamerlane, when it had a population of 150,000. The Russians annexed it in 1868. They have garrisoned it and greatly improved its streets and enlarged its trade. Population, 1918, 91,384.

SAMNITES, the name of several tribes who occupied a part of ancient Rome, where they dwelt as contemporaries of the Sabines. They were a confederation of tribes, organized more perfectly than the Sabines, from whom they appear to have descended. Later they came in contact with the Romans in the northern part of Campania and were finally defeated in 272 B. C. Ultimately they were absorbed by the Romans, whose language and customs they adopted.

SAMOAN ISLANDS (sā-mō'an) or **Navigators' Islands**, an island group in the Pacific Ocean, east of the northern part of Australia and 4,200 miles southwest of San Francisco, Cal. It embraces twelve islands, but only three are of particular importance. These are Upolu, Savaii, and Tutuila, the last named belonging to the United States and the remainder of the group to Great Britain. The area of the group is



SAMOA, OR THE SAMOAN ISLANDS.

Turkestan, 128 miles east of Bokhara. It is situated on the Transcaspian Railroad and is surrounded by a fertile plain. Among the noteworthy buildings are several dating from the early historic period. They include three sacred colleges, situated in the center of the city, and the palace of the emirs of Bokhara, which has been converted into a hospital by the Russians. It has a considerable trade in cereals, salt, live stock, and fruits. The manufactures include woolen and silk textiles, pottery, clothing, leather, utensils, and machinery. Samarkand was captured by Alexander the Great while on his march to Southern Asia. It became a sacred Moslem city after it was captured by the Arabs in 712 A. D., and in the 14th century it was made

1,700 square miles. These islands are of volcanic origin, but in some regions are characterized by coral additions and reefs. Their surface is diversified by hills and mountains, but in the main it is remarkably fertile, with an abundance of wood and luxuriant vegetation. No native fauna prevails in the islands, the only indigenous animal being a species of bat. The principal productions are cotton, coffee, sugar, tobacco, cocoanuts, copra, and many kinds of fruits. Cattle, horses, swine, sheep, and poultry have been imported within recent years and are now raised successfully. The islands are of importance for their location on the direct route between the Panama Canal and the East Indies.

The natives of the Samoan Islands are of the brown Polynesian race and were long governed by a native king. They engage principally in fishing and fruit culture. In 1889 an agreement was effected whereby the islands became neutral under a protectorate of Germany, the United States, and Great Britain. After complications in regard to the election of a king, a different treaty was made and all but Tutuila passed to the possession of Germany. This treaty was ratified by the United States in 1900. Tutuila has an area of 54 square miles and on its shore is the fine harbor of Pago-Pago. Savaii is the largest island of the group, having an area of 658 square miles. Upolu has an area of 340 square miles. The latter contains the town of Apia, with a population of 1,950. It is the capital of the British possessions. The British occupied these possessions in 1914, and placed them under the administration of New Zealand. Population, 1915, 39,885.

SAMOS (sā'mös), an island off the coast of Asia Minor, in the Aegean Sea, 45 miles southwest of Smyrna. It has an area of 180 square miles and forms a principality of Turkey. The surface is diversified by a range of mountains, of which Mount Kerkis is the culminating peak, 4,730 feet high. It has an abundance of timber, a fine climate, fertile soil, and adequate rainfall. The principal products include corn, olive oil, raisins, wine, skins, and fruits. It has valuable deposits of iron, lead, marble, and other minerals. Among the manufactures are leather, spirituous liquors, utensils, clothing, carpets, pottery, and textile fabrics.

Anciently Samos was one of the most famous Grecian islands and formed an influential member of the Ionic confederation. It possessed a powerful navy and under Polycrates, in 532 B. C., it was the predominating influence of the archipelago. It became a Roman province in 84 B. C., when its capital was made a free city. Samos was conquered by the Turks in 1550 and did not rebel against Turkish rule until in 1821. Though that war established the independence of Greece, Samos remained a Turkish possession, but since 1832 its government has been administered under a Greek prince, tributary to the Sublime Porte. Chora is the chief town. In 1918 the island had a population of 51,608.

SAMOTHRACE (sä-mō-thräs'), or **Thracian Samos**, an island in the northern part of the Aegean Sea, belonging to Turkey. It is the most elevated island of the Grecian Archipelago. The area is 65 square miles. The highest peak, Mount Sáoce, is 5,245 feet above sea level. This mountain may be seen from the Plains of Troy. From its summit Poseidon watched the decisive contest in the Trojan War. It has no harbor of importance, but has a considerable area of fertile soil, and is celebrated in history as the scene of sacred worship to the Cabeiri. The inhabitants aided Xerxes in the Battle of Salamis. Population, 2,375.

SAMPSON (sămp'sŭn), **William T.**, naval officer, born in Palmyra, N. Y., Feb. 9, 1840; died May 6, 1902. He graduated from the United States Naval Academy at Annapolis in 1861, entering the navy the same year as master, and the following year became lieutenant. In the Civil War he was on the practice ship *John Adams* and the monitor *Palapasco*, serving on the latter when it was destroyed at Charleston in 1865.



WILLIAM T. SAMPSON.

During the next two years he served in the European squadron, became commander in 1874, and was made captain in 1889. He had superintendence of the Naval Academy from 1886 to 1890, becoming commander of the *San Francisco* in the latter year. From 1892 until 1897 he was chief of the bureau of ordnance, and at the beginning of the Spanish-American War succeeded to the command of the North Atlantic squadron. President McKinley appointed him commodore on July 3, 1898, and, after the Battle of Santiago, fought on the latter date, made him rear admiral. On Aug. 16, 1898, he was made one of the commissioners to arrange for the Spanish evacuation of Cuba. The closing years of his life were clouded by a controversy between his friends and those of Admiral Schley, both claiming credit for the victory at Santiago.

SAMSON, one of the judges of Israel, son of Manoah, who flourished about 1116-1096 B. C. He was of the tribe of Dan, a native of Zorah, and is noted as a hero of the Israelites and an avowed enemy of the Philistines. He became a Nazarite at birth and his head remained unshorn and his lips never tasted of wine. It is recorded that he was endowed with peculiar physical power, which enabled him to tear a lion to pieces. His great strength enabled him to slay 1,000 Philistines and to carry away the gates of Gaza. He became enamored of Delilah of Sorek, to whom he imparted the secret that his physical strength was due to his hair, which had never been shorn. She soon after deprived him of this endowment by cutting off his hair, but with the growth of it his strength returned, and on the occasion of the festival of Dagon, Samson avenged himself against the Philistines, who had blinded him in the absence of his strength, by pulling down the pillars of the building in which they had assembled, but perished with them. Milton's "Samson Agonistes" is a drama that makes use of the story of Samson's death.

SAMUEL, the last judge of Israel and the first of the order of prophets. He was the son of Elkanah and Hannah, who dedicated the child

to the Lord. His training was in the sanctuary at Shiloh, under the teaching of Eli, the high priest, and while there he received the first prophetic call. Twenty years after the death of Eli he assumed the judgeship of Israel. He is credited by some writers with the authorship of the Book of Judges and a part of the books of Samuel.

SAN ANGELO, county seat of Tom Green County, Tex., 298 miles northwest of Austin, on the Concho River and on the Santa Fé and the Orient railroads. The surrounding country produces cattle, wool, sheep, and pecans. It has gas and electric plants, street railways, and large stock yards. The features include the high school, courthouse, city hall, and federal building. Population, 1920, 9,392.

SAN ANTONIO (săn ăn-tō'nī-ō), a city of Texas, county seat of Bexar County, on the San Antonio River, 80 miles southwest of Austin. It has transportation facilities by the Missouri, Kansas and Texas, the Southern Pacific, the International and Great Northern, and other railroads. The location is healthful and the climate is favorable, having an elevation of about 650 feet above sea level. The streets are regularly platted, but some of the older thoroughfares are narrow. Vitrified brick, asphalt, and macadam have been used largely in constructing pavements. The streets are well lighted with gas and electricity and an extensive system of electric railways furnishes communication with urban and suburban points. Many afflicted with pulmonary diseases find the city and its vicinity favorable as a resort, and it has hot wells with distinctive curing properties.

Fort Sam Houston, located near the city, is an important army post of the United States and covers about 250 acres. Breckenridge Park, a semitropical woodland of 200 acres, borders on the San Antonio River, which flows through the city and is joined within the limits by San Pedro Creek. On the latter is San Pedro Park, a tract of 40 acres. Among the principal buildings are the county courthouse, the city hall, the Carnegie Library, and the Federal building. The educational institutions include the Santa Anna Female College, the Saint Louis College, the Saint Mary's Hall, and the Peacock's School for Boys. It has many hospitals and charitable institutions, including the Southwestern Insane Asylum, the Santa Rosa Hospital, and the Physicians' and Surgeons' Hospital. San Fernando Cathedral and Saint Mark's Cathedral are among the ecclesiastical buildings. The business and office buildings include the Southern Hotel, the Alamo National Bank, the Menger Hotel, and the Hicks Building. Many fine public and parochial schools are maintained.

San Antonio has a large wholesale trade. It is important as a shipping point of live stock, cereals, and fruits. The manufactures include malt liquors, ironware, flour and grist, cement and earthenware, machinery, tobacco products,

and clothing. An abundance of fine water is obtained from artesian wells. The sewer system has about 80 miles of mains.

San Antonio was settled by Spaniards in the latter part of the 17th century. The mission of San Antonio de Valero was founded in 1718. A colony from the Canary Islands came to the vicinity in 1831 and Texan patriots took possession of it in 1835. The following year occurred the storming of the Alamo, where the entire garrison was massacred by the Mexicans under Santa Ana. American pioneers came in large numbers after the decisive Battle of San Jacinto and many Germans settled in the vicinity after the annexation of Texas. In 1861 it was occupied by Confederate forces. The rapid growth began in 1878, when the first railroad was built into the city. Population, 1920, 161,379.

SAN BERNARDINO (bēr-nār-dē'nō), a city of California, county seat of San Bernardino County, 62 miles east of Los Angeles. It is on the Southern Pacific and the Atchison, Topeka and Santa Fé railroads and has urban and interurban communication by electric lines. The surrounding country is devoted to farming, fruit growing, and mining. In the vicinity are mineral baths, hence it is visited by a large number of tourists. The principal buildings include the county courthouse, the public library, the State hospital for the insane, a business college, and several fine schools and churches. Among the industries are machine shops, foundries, grain elevators, and railroad shops. It has a large trade in hay, fruits, and merchandise. A company of Mormons settled in the vicinity in 1851. It was incorporated in 1854, but declined on account of a removal of the Mormons, and it was rechartered as a city in 1863. Population, 1900, 6,150; in 1920, 18,721.

SANBORN (săn'bŭrn), **Franklin Benjamin**, author, born at Hampton Falls, N. H., Dec. 15, 1831; died Feb. 24, 1917. He graduated at Harvard, became interested in the cause of anti-slavery, and in 1856 was chosen secretary of the Massachusetts-Kansas committee. From 1863 to 1868 he was secretary of the Massachusetts State Board of Charity, of which he was chairman from 1874 to 1878, and was actively interested in reforming the Tewksbury Almshouse. He was a founder of the Massachusetts infant asylum, established the Concord Summer School of Philosophy, and for some years was editorial writer for the *Springfield Republican*. His published works include "Life of Thoreau" and "Life and Letters of John Brown." He edited the poems of the younger W. E. Channing, Brownson Alcott's "Sonnets and Canzonettes," and William E. Channing's "Wanderer."

SAN CRISTÓBAL (krēs-tō'vāl), a town of Mexico, in the state of Chiapas, about 135 miles south of the Gulf of Campeche. It is located on a plain fully 6,500 feet above the sea, and in the vicinity are ruins of ancient buildings constructed by the Indians. The principal structures in-

clude a cathedral and a number of educational institutions, such as a seminary and several academies. It has manufactures of earthenware, textiles, clothing, and utensils. Population, 1917, 15,380.

SAND, the particles of granular stone that are coarser than dust and finer than gravel. It results from the gradual disintegration of rocks under the action of water, but also from other causes, such as the detachment of particles from boulders and pebbles under the movement of particles due to frost, wind, or water. The color of sand corresponds to that of the minerals in the rock from which it is derived. In many places vast deposits of sand form under the action of water, as along the sea coast in consequence of wave action and in streams from the effect of running water. Extensive strata of sand were formed in different geological periods, occurring at various depths and ranging in thickness from a few inches to many hundreds of feet. In many places are deposits which originate from the action of wind, as in desert regions, where the dry sand is carried and deposited in drifts or sheets. Frequently such drifts are carried into the sea, as on the western coast of North Africa. In some regions, as in Poland, the sand deposits were formed largely by the action of glaciers, while on the coasts of many islands and continents vast dunes were formed. Similar sand deposits are still forming under the action of sea waves and currents. Sea sand often contains minute fragments of shells, particles of sponges, and other remains of animal matters. Siliceous sands serve many important purposes, including the manufacture of glass and the preparation of mortar. They are used in making molds for casting, preparing filters, and improving dense clay soils for cultivation. Deposits of valuable minerals occur in many placers, such as gold, copper, tin, diamond, iron, etc.

SAND, George, eminent novelist, born in Paris, France, July 5, 1804; died June 7, 1876. She was the daughter of Lieut. Maurice Dupin, who died when she was four years of age. Her maiden name was Armantine Lucile Aurore Dupin, but she is generally known by her nom de plume, *George Sand*, and as Aurore Dudevant, her marriage name. After receiving an education in a convent in Paris, she was married to M. Dudevant, in 1822, but in 1831 became separated from her husband and engaged in literary work. Her first work was written in conjunction with Jules Sandeau, a lawyer of Paris, and consisted of a romance entitled "Rose et Blanche." After that many novels came from her pen and a number of them possess such literary value that she may be regarded one of the greatest of French novelists. She was associated with many leading literary men of her time, both in France and foreign countries, and to enrich her mind visited several European capitals to consult libraries and come in contact with works of art. It may be said that she was

superb as an artistic writer, devoting much of her efforts to the cause of human progress and treating her subjects in a marked purity and simplicity of language, through all of which runs a vein of practical good sense. Among her best known works are "Valentine," "André," "Indiana," "Lelia," "Leone Leoni," and "Mauprat." She published an interesting work entitled "The History of My Life."

SANDALWOOD (săn'dal-wōd), the wood of any one of several trees of the sandalwood family. These trees are native to the East Indies and other islands of the tropical regions of the Pacific. Sandalwood trees are greatly branched evergreen trees, with opposite leaves and compact and fine-grained wood. They are peculiar for yielding a highly fragrant wood, from which perfume is derived, but it is used more largely for the manufacture of ornamental products, such as desks, glove boxes, and other light articles. A large number of species have been described, including the white, yellow, and red sandalwood. Most species do not grow to more than a foot in diameter. The *Indian sandalwood* trees attain a height of thirty feet and mature in twenty to thirty years. A thick, viscid oil is expressed from the seeds. It is used by the poorer classes of India for illuminating purposes. Only the heartwood is employed for sandalwood oil, from which perfume is made, but it is also used for incense and in painting sacred figures. Several species of trees native to the Hawaiian Islands yield a sandalwood which is remarkable for its fragrance and the presence of a valuable oil.

SAND BLAST, an apparatus for propelling a jet of sand, which is utilized in engraving and cutting glass. The sand is blown by means of air or steam with great force from a tube. When the stream is directed against the article to be cut or engraved, it acts with remarkable rapidity, and as soon as the stream is turned off the article acted upon is left in a clean condition for the inspection of the workmen. The sand blast was invented by B. C. Tilghman, of Philadelphia, and is now employed largely in engraving goblets, glass household utensils, and glass globes for lamps and gas-burners. The apparatus may be used in engraving patterns on marble and metals, a paper or lace figure being placed on the surface to protect the parts that are to remain untouched.

SAND BUR, the name of a weed common to sandy regions of the Temperate zones. It is a small plant, very similar to the shorter native grasses, and locally is called *burgrass*. Small spiny burs develop in large numbers and mature early in autumn. They are injurious to live stock, especially sheep, since they become attached to the hair and wool.

SANDERLING (săn'dēr-līng), a class of wading birds of the snipe family, which are widely diffused in the Northern Hemisphere. birds of this species breed in the Arctic regions,

both in America and Europe, and on the approach of winter move southward as far as Brazil and Africa. Their plumage is a reddish tinge with dark markings in the spring and an ash-



SANDERLING.

gray in the winter. They are about eight inches in length, with an alar extent of thirteen inches. The nests are built under bushes, or amid weeds with a slight lining of dry grass, in which two to four

eggs are laid. They have a plaintive voice similar to the small sandpipers. Sanderlings feed on worms, small crustaceans, and tender plants. They are esteemed as a food.

SANDHURST (sănd'hûrst), or **Bendigo**, a city of Australia, in the State of Victoria, capital of Bendigo County, 98 miles northwest of Melbourne. It has railroad communication, being on the line between Melbourne and Sydney, and is surrounded by a farming and gold-mining country. The streets are beautifully platted and improved with parkings and pavements. The features include the public park, the county courthouse, the public library, the city hospital, the botanical garden, and the Mechanics' Institute. Among the manufactures are machinery, earthenware, leather, clothing, spirituous liquors, vehicles, and furniture. The surrounding country is noted for its fine farms and orchards. About 5,500 miners are employed in the gold fields. The place was founded in 1851 and was chartered as a city in 1871. Population, 1916, 48,565.

SAN DIEGO (săn dê-ă'gô), a seaport city in southern California, county seat of San Diego County, on the Pacific coast. It is on the National City and Otay and the Atchison, Topeka and Santa Fé railroads and has regular communication by steamships. The harbor, situated on San Diego Bay, is deep and landlocked. In the surrounding country are extensive orchards of tropical fruits, including oranges, olives, date palms, figs, and grapes. Two tracts of land in the vicinity are reserved by the Federal government, one for a coaling station and the other as a fortification, the latter being known as Fort Rosecrans. It has a large export and wholesaling trade in fruit and produce. Among the manufactures are tobacco products, boilers, hardware, machinery, carriages, canned fruit, flavoring extracts, wine, and leather.

San Diego has a healthful climate and is known as a summer resort. North of the city is the old town of San Diego, which is noted as the oldest in California, and a lake of boiling mud half a mile long is a **short distance from**

the new city. Coronado Beach, a popular summer resort, is opposite San Diego, on the south side of San Diego Bay. It has the Hotel del Coronado, an ostrich farm, and a botanical garden. Among the noteworthy buildings in San Diego are the county courthouse, the Carnegie Library, the State normal school, the Hospital of the Good Samaritan, and the Academy of Our Lady of Peace. It has many fine hotels and business blocks. Near San Diego is a fine monument to Richard A. Proctor. San Diego County is remarkable for its fertility, and ranks as the chief honey-producing region of the State. The place was occupied for the United States in 1846 by Commodore Stockton, from whom Fort Stockton was named. The present charter was granted in 1889. Population, 1900, 17,700; in 1920, 74,683.

SAN DOMINGO (săn dô-mên'gô), or **Santo Domingo**, the capital of the San Domingo Republic, on the south shore of the island of Hayti. It is located at the mouth of the Ozama River, where it was founded by Bartholomew Columbus in 1496, and is the oldest European city in America. The streets are broad and regularly platted, intersecting each other at right angles. The harbor is spacious, has good anchorage, and is the scene of considerable trade in tobacco, fruits, cotton, and sugar. Among the principal buildings is a cathedral dating from 1540, in which the remains of Columbus were preserved from 1536 until 1794, when they were removed to Havana. Other buildings of importance include the capitol and a university. It has several hospitals, schools, and churches. San Domingo is the seat of a bishop's see and an arsenal. Population, 1921, 30,957.

SAN DOMINGO, or **Dominican Republic**, a government comprising the eastern part of the island of Hayti, the western part being the Republic of Hayti. It includes the larger but less populous portion of the island. The area is 18,045 square miles. Three principal mountain chains traverse San Domingo. The largest chain trends through the central part, while one lies along the northern coast, and the other chain extends from the Hayti Republic into the southwestern region. The surface is generally fertile and includes great plains and savannas, the most extensive lying in the southern part and between the central and northern mountain ranges. Among the principal rivers are the Rio de Yaque and the Youna. The coast plains are extensive, except in the northern part, and are drained by numerous small streams. The climate is generally favorable and healthful. However, the natural resources have not yet been developed to a material extent. It has considerable deposits of gold, iron, copper, salt, coal, and other minerals. Valuable forests of logwood, mahogany, pine, satinwood, fustic, and lignum vitae are abundant.

Agriculture is the principal occupation. Fully 15,500 square miles of the surface are fit for

cultivation. The principal products are sugar cane, coffee, rice, molasses, tobacco, cotton, beeswax, and fruits. It yields an abundance of fish products and domestic animals, the latter including mules, horses, cattle, and poultry. About 280 miles of railroads are open to traffic, most of which are owned or controlled by the government or by foreigners. As a general rule the highways are in a poor condition, but some of the leading thoroughfares have been well graded and macadamized. Foreign commerce is not material. The principal exports are tobacco, coffee, timber, sugar, and fruits. Among the leading imports are manufactured articles, earthenware, and clothing. Germany and the United States have the larger share of the foreign commerce.

The government is under a constitution that vests the chief administrative authority in a president. The chief executive is chosen by an electoral college for a term of four years and has the assistance of a departmental cabinet. Legislative power is vested in a congress of 24 deputies who are elected by indirect vote, in the ratio of two for each province, for the term of four years. Chief judicial authority is exercised by a supreme court of justice. The judges of the supreme court are appointed by the president, and under them is a system of courts of first instance and local justices. Spanish is the prevailing language. It has a system of public education, comprising primary and secondary schools. These schools are supplemented by a normal school and several institutions of higher learning. Attendance upon the elementary schools is free and nominally compulsory. Roman Catholicism is the state church, but other denominations are tolerated under certain restrictions. The inhabitants embrace a comparatively large per cent. of whites, but they are chiefly mulattoes, mestizos, and Negroes. San Domingo is the capital and Puerto Plata is the chief port city.

At the time Columbus discovered the island of Hayti, in 1492, it had a larger population than at present, but many of the aborigines perished under Spanish control. A formidable revolt against the Spanish took place in the 17th century, which resulted in the western part of the island being ceded to France in 1697, but the eastern part, now mainly forming the San Domingo Republic, remained a Spanish possession. A Negro revolt against France, in 1791, soon brought the entire island under the control of Toussaint L'Ouverture (q. v.), who made it an independent republic. Soon after he fell into the hands of French captors, but Dessalines drove the French out in 1803. However, he was assassinated in 1806. Insurrections and revolutions occurred at various times, but France recognized the republic in 1825, and Spain finally evacuated the island in 1865. Since then the two republics have existed with more or less change and uncertainty, disturbances

being due largely to dissatisfied and restless elements made up of people of mixed blood. Among the latest disturbances in the San Domingo Republic was a revolution in 1898, which terminated in the assassination of the president on July 26, 1899. Population, 1914, 716,509.

SANDPAPER, the commercial name of a stout paper covered with sharp sand or ground glass, which is embedded in glue. It is used for smoothing or polishing ivory, wood, bone, and other materials. The paper employed in making this product is usually of a stiff brown kind, which is covered with glue, and afterward the sand is sifted upon the glue before it is fully dry. Sandpaper is made of various sizes and different grades. The coarser material is used for less delicate work, while the finer is made of very small grains of sand and used for polishing or smoothing surfaces of a delicate kind. Emery paper differs from sandpaper in that emery is used in the former instead of sand.

SANDPIPER (sănd'pī-pēr), an extensive group of wading birds of the snipe family. They are found in large numbers in swampy regions, on the shores of the sea, and on the banks of rivers, lakes, and ponds. They are migratory, moving far northward in the spring. Several species migrate as far as Greenland, Spitzbergen, and Nova Zembla. The



SANDPIPER.

common species include the dunlin, red, little stint, purple, wood, ruff, green, and summer sandpipers. These birds are found in all parts of the world where water is abundant. They have long legs, a long slender bill, and a short tail, and are quite active and graceful. They run and fly with rapidity, and spend much time wading in shallow water in search of food, which consists of insects, mollusks, worms, and the tender parts of plants. The *purple sandpiper* is the most common American species. In all species the summer plumage is different than that of winter, and they are prized for their flesh, which is both tender and well flavored. The voice is unmusical and may be heard for some distance as the bird flies through the air or runs along in the shallow water.

SANDSTONE, a class of rocks formed of particles of quartz sand cemented together with silica. Many kinds of sandstone occur in nature, varying in composition from grains of quartz scarcely visible to the naked eye to coarse formations composed of pebbles and gravel. The color differs according to the sand forming them, usually varying from gray to reddish-

brown, but in many cases there is a mixture of different colors, due to the presence of particles of mica, feldspar, granite, flint, and other substances. A marked difference is observable in the consistency. Some are quite soft and porous, while others are very hard and durable. Sandstone of fine grain and uniform color is usually preferred for building purposes, while the coarser-grained species are useful in making millstones for grinding cereals. The latter kind is used for whetstones and grindstones. Vast formations of sandstone are met with in deposits of different geological ages, most of which are stratified horizontally, but in some cases they are in an inclined or vertical position. Many buildings in New York City are of the dark-brown sandstone secured in New Jersey. Deposits of sandstone of value in building occur in many sections of Canada and the United States.

SANDUSKY (săn-dūs'kī), a city of Ohio, county seat of Erie County, on Sandusky Bay, near Lake Erie, 55 miles west of Cleveland. Communication is furnished by steamships on the Great Lakes and by the Baltimore and Ohio, the Lake Erie and Western, the Lake Shore and Michigan Southern, and other railroads. It is beautifully situated at the mouth of the Sandusky River and has an excellent harbor. It has extensive wharves, and a large lake trade in limestone, salt, fish, wool, lime, coal, flour, cereals, and live stock. The streets are beautifully paved and intersect each other at right angles. Gas and electric lights, street railways, waterworks, and an extensive sewerage system are among the improvements. The manufactures include engines, boilers, railroad cars, machinery, spirituous liquors, edged tools, lumber products, and farming implements. Shipbuilding is an important industry.

Much of the architecture is substantial, being of brick and stone, the latter being obtained from quarries in the vicinity. The noteworthy buildings include the county courthouse, the public library, the high school, the Federal building, the county infirmary, and many fine churches. It is the seat of the Ohio Soldiers' and Sailors' Home and of the State fish hatchery. Popular summer resorts are maintained at Cedar Point and Put-in-Bay. It is one of the largest fresh-water fish markets in the United States. The place was settled in 1817 and incorporated as a city in 1845. Population, 1920, 22,897.

SANDWICH ISLANDS (sănd'wīch). See **Hawaiian Islands**.

SANDY HILL, a village of New York, in Washington County, forty miles north of Troy. It is on the Hudson River and the Delaware and Hudson Railroad. In the vicinity are lumber mills and stone quarries. The manufactures include paper, machinery, wall paper, and lumber products. It has waterworks, electric lighting, and a number of schools and churches. Population, 1905, 5,321; in 1910, 5,450.

SANDY HOOK, a peninsula extending from Monmouth County, New Jersey, to the entrance of New York harbor. It is a low and sandy point of land about nine miles long. At its northern end is the Sandy Hook lighthouse, ninety feet high, and immediately south of it are fortifications for defending the entrance to New York harbor. In connection with the government fortifications is a proving ground, at which armor plate and ordnance are tested.

SANDYS (săndz), **Sir Edwin**, statesman, born in Worcester, England, in 1561; died in 1629. After graduating at Oxford University, he became an active supporter of the claim of James I. to the throne and was knighted in 1603. He was a member of the Virginia Company and while holding office in that concern he instituted many reforms in the American colonies. He published "Survey of the State of Religion in the Western Parts of the World."

SAN FRANCISCO (săn frăn-sīs'kō), the largest city on the Pacific coast of North America, in the State of California, coextensive with San Francisco County. It is situated on a peninsula lying between the Pacific and the Bay of San Francisco and on the opposite shore of the bay, due east, is the city of Oakland. San Francisco Bay is about 46 miles long from north to south, from six to ten miles wide, and north of it is San Pablo Bay, a body of water about ten miles long, which receives the discharge from the Sacramento and San Joaquin rivers through Suisun Bay. The Golden Gate, a strait five miles long and a mile wide, connects San Francisco Bay with the Pacific. Among the islands near the city are Goat, Alcatraz, and Angel islands, and in San Pablo Bay is Mare Island, which is used as a navy yard by the United States government. The shores of the bays near San Francisco are generally formed of precipitous cliffs, particularly those of the Golden Gate, and the whole region is one of remarkably picturesque scenery. Sand dunes extend along the ocean and they merge into a series of hills, which culminate in Mount San Bruno, in San Mateo County.

COMMUNICATION. The city has steamboat connections with the principal ports of the world and its harbor in San Francisco Bay takes rank with the finest in America. This harbor has an area of 450 square miles. Railroad transportation is chiefly by the Southern Pacific and connecting lines, but only one of the roads enters the city, while freight and passengers are carried by ferries and steamers from Oakland, Alameda, West Berkeley, Sausalito, and other points. An extensive system of electric railways furnishes intercommunication, and cable lines are operated in the undulating and hilly sections. Many of the towns and cities in the vicinity, though organized as separate corporations, may be considered suburban, and have

been built up largely through easy communication by steamers and railway lines.

STREETS. In the older part of the city, near the water front, the streets are narrow, but they are of ample width in the newer and greater part of the municipality. The ferry depot, on the bay, is at the head of Market Street, which is the chief thoroughfare and extends in a southwesterly direction. North of it the streets are platted according to the cardinal points, but toward the south is the older part, in which the streets are more or less irregular. About 800 miles of streets have been improved for travel, a large part having been paved with bituminous rock, basaltic rock, cobblestones, and asphalt. The city is generally well lighted with gas and electricity and has extensive systems of waterworks and sewerage. Market Street contains the largest office buildings and department stores, but shopping is extensive on Post, Kearny, Geary, Sutter, and Grand avenues, and considerable shopping is carried on at Union Square and on Stockton

Bay. Many small parks are located at convenient places in the city. Laurel Hill Cemetery, Calvary Cemetery, and the City Cemetery are in the northern part. The beach along the ocean is much used for bathing and at its northern end is the Cliff House. Near the latter are the noted Seal Rocks, where sea lions are frequently seen in large numbers. The chief memorials include a monument to Francis Scott Key, in Golden Gate Park; a bronze group representing the development of California, near the City Hall; and a column to commemorate the naval achievements during the war with Spain, in Union Square.

BUILDINGS. The architecture of the city is largely of modern construction, in which the steel frame and granite are prominent. Structures of this class began to be erected in 1890, when the *Chronicle* building was completed. This is a ten-story fireproof structure and withstood the earthquake of 1906. Other large buildings include the post office, the city hall, the county courthouse, the government mint,

the subtreasury, and numerous office and business blocks. Among the institutions that are housed in fine buildings are the Hopkins Art Institute, the Memorial Museum, the public library, the Mechanics' Institute, the Cooper Medical College, the College of Christian Brothers, the San Francisco State Normal School, and Saint Ignatius College. The city has many fine ecclesiastical structures, including the Roman Catholic cathedral. Besides the public library of 115,000 volumes may be mentioned the Mercantile Library of 75,000 volumes and the Sutro Library of 200,000 volumes. Many ward



ENVIRONS OF SAN FRANCISCO.

Street. North of Market are the larger number of residences, while the district south has many wholesaling and manufacturing enterprises. The most fashionable quarters are on Nob Hill, which is about 300 feet above sea level and overlooks the bay and city. Pacific Heights is somewhat higher and Twin Peaks, the highest summits, are 900 feet above the sea.

PARKS. Golden Gate Park, the most beautiful in the city, extends from the western part to the ocean. It contains about 1,100 acres, about one-third of which is in greensward and the remainder is covered with beautiful flowers and trees, many of which are semitropical. Within this park is a zoölogical collection, a museum, an aviary, and numerous statues. The Presidio, a military reservation of the government, is located in the northern part, where Fort Winfield Scott overlooks the entrance to the Golden Gate. Fort Miley, Fort Barry, and Fort Baker likewise defend the entrance to San Francisco

schools and private and parochial institutions of learning are maintained.

The city has a large number of clubs and educational associations. Among the theaters are the Columbia, the Alcazar, the California, and the Grand Opera House. The Palace, the Saint Francis, and the Occidental are the leading hotels.

INDUSTRIES. San Francisco is a distinctively commercial and manufacturing city. It has a large wholesale and jobbing business, both inland and coastwise. Large quantities of coffee, tea, and sugar are imported. It is an extensive exporter of wine and brandy, wheat, salmon, fruits, lumber, and live stock. In value the exports somewhat exceed the imports, the total foreign trade averaging about \$90,500,000 per year. As a manufacturing city, San Francisco holds tenth rank in the United States. The larger interests are vested in slaughtering, meat packing, sugar refining, and shipbuilding.

Among the general manufactures are canned fruit, clothing, flour and grist, boots and shoes, leather, earthenware, cordage, machinery, furniture, glass, saddlery, and tobacco products. Among the large vessels constructed in its yards are the *Oregon* and the *Olympia*, two large battleships of the United States.

HISTORY. Franciscan friars discovered San Francisco Bay in 1718, but a permanent settlement was not made until 1776, when the mission of San Francisco de Asisi was founded. In the same year a military post was established by the Spaniards. The village of Yerba Buena took its place in 1835. At the beginning of the Mexican War, in 1846, the region was taken possession of by the United States and the name was changed to San Francisco the following year. From that time to the present the history of the city reads like a fairy tale. Many incidents of special interest are connected with the events occasioned by the discovery of gold in 1848, when people from all parts of the world gathered here and made it the center of remarkable enterprise. Destructive fires did great damage in 1849 and in 1851. The catastrophes were attended by more or less lawlessness, resulting from the coming together of large numbers who were attracted by the reports that fortunes could be made in a few days. However, these primitive conditions were soon overcome by the organization of vigilant committees, which summarily hung or imprisoned the lawless leaders.

In 1906 the city was visited by a destructive earthquake. It occurred at 5:16 o'clock on the morning of April 18, when much damage was done to many buildings and the main supply pipe of the waterworks was broken. Falling timbers and other materials caused fires to break out in many places, and a lack of water made it impossible to control the flames. For four days the fires continued, in which about 500 blocks were laid waste. Official records place the loss of lives at 427 and the loss of property at \$500,000,000. From this wreck of matter a new and more substantial city has risen, equipped with excellent systems of sewers and waterworks, and beautified by larger and more substantial architectural structures.

The inhabitants include a large number of foreign birth, of which the most numerous are the Germans, Irish, Chinese, English, and Italians, in the order named. Other nationalities include Greeks, Maltese, and Spaniards. The Chinese, though confined to their own quarters, are not as numerous as they were in 1890, when they numbered 25,833, which is about twice the present number. Population, 1920, 506,676.

SAN FRANCISCO. See *São Francisco*.

SAN GERMÁN (sän hēr-män'), a city of Porto Rico, in the province of Mayaguez, about eight miles southeast of the city of Mayaguez. It is situated near the Rio Grande and has large commercial and manufacturing interests.

In the vicinity are valuable forests and plantations. The first settlement was made here by the Spanish in 1543. Population, 1918, 4,368.

SANGIR ISLANDS (sän-gēr'), an island group of Malaysia, situated between Celebes and the Philippines. The area is 408 square miles. It is a possession of Holland. The group comprises many small islands, of which Great Sangir is the largest, having a length of thirty miles and an average width of ten miles. The islands are of volcanic origin and contain a number of active volcanoes, of which Abu, on Great Sangir, is the most important. This volcano was in a state of active eruption in 1856, when 2,850 persons perished. Most of the islands are inhabited and have a fertile soil, producing cocoa palms, fruits, hemp, timber, rice, sago, and tobacco. Population, 1916, 114,876.

SANHEDRIM (sän'hē-drīm), a council and tribunal of the Jews. It is thought to date from the time of the Maccabees and probably was established under John Hyrcanus. Some writers trace its origin to the seventy elders appointed by Moses, but this view is not supported by the early Greek writers. In the later period there were several sanhedrims, of which the Great Sanhedrim was the supreme authority. It was composed of 71 priests, scribes, and elders of the people. At the time of the Romans it was presided over by the high priest. The members sat in a crescent, the high priest occupying a seat in the middle higher than the rest. He was supported on the right by the father of the council, called the *Ab-beth-din*, and on the left by a learned referee. It originally had power of life and death, but this it ultimately lost. Herod was summoned before the sanhedrim in 47 B. C. for putting people to death, and Jesus was condemned by it for claiming to be the Messiah. It ended in 425 A. D., when Theodosius put the last president to death. The lesser sanhedrims, or provincial courts, of which there was one in each large town, were composed of 23 members appointed by the Great Sanhedrim in the city of Jerusalem.

SANITARY SCIENCE (sän'ī-tā-rŷ), the branch of study relating to the preservation of health and prevention of disease, both as to communities and individuals. This science is not only concerned with the mission of teaching the correct mode of life to individuals, but in an enlarged sense embraces the study of the methods of preventing disease and preserving bodily functions by means of supplying the most serviceable and wholesome dwellings, food, and clothing that may be obtained. It is essential that dwellings and public buildings be constructed in conformity with plans so devised that the most wholesome means of obtaining ample light and ventilation may be secured, and that the drainage be adequate to the highest needs. With this end in view many cities have placed the supervision of buildings in a state of construction under a competent director,

especially with the design that sewerage, drainage, light, and water connections be provided for properly. Within late years growing concern has been manifested in the matter of overcrowded dwellings in cities, in which diseases of an epidemic character often originate, with a view to guard against unwholesome gases generating from the waste of organic and other refuse matters.

Legislators, both in the nation and in the states, have directed their attention with a view of providing safeguards against impure and unwholesome food, which in many cases is put on the market to enhance profits, but which result in injury to health and life. As a general rule it is recommended that all dwellings be provided with ample bathing facilities and an adequate supply of pure water, thus enabling the occupants to take such baths as are needed to insure ample cleanliness, and to flush closets for the purpose of removing waste and impurities with speed and effect. Plenty of outdoor exercise is recommended as a prolific source of physical strength. The practice of virtues and freedom from anxiety have a wholesome influence in promoting and preserving health. In many countries it is necessary to secure the approval of the government board of health of plans for new water-supply and sewer systems that are proposed in the large cities. However, in general, the states of the United States and the provinces of Canada extend to cities the power to regulate the sanitation within their territory. This has resulted in marked improvements in the larger cities, where public supervision is operating to overcome to a large extent the conditions that are injurious to health.

In 1861 the United States Sanitary Commission was organized by New England women for the relief and comfort of Union soldiers during the Civil War, in the camp and field. This organization was designed to supplement the army medical bureau. It rendered very efficient service in improving the clothing, ventilation, cookery, and drainage. This work is regarded one of the most perfect exemplifications of charity, and it may be said that much of the suffering and bitterness incident to war were dissipated by the prompt work of the association. Besides distributing many supplies to the soldiers and sailors, it established hospitals and homes at recruiting points, and provided hospital steamers and cars for wounded and sick soldiers. The affairs were managed by a board of 25 commissioners, of which Henry Bellows, of New York, was president. The commission received, from its organization to the surrender of its charter, money amounting to about \$6,000,000 and goods valued at about \$15,000,000, all of which it distributed at points most in need of assistance. See **Hygiene**.

SAN JACINTO (săn jă-sîn'tō), **Battle of**, the closing battle of the war for independence

of Texas, which took place near the town of San Jacinto, Tex., April 21, 1836. The Texan army of 783 men under General Houston was attacked by 1,536 Mexicans under Santa Anna and, after a desperate struggle of an hour, in which the Mexicans lost about 600 men, the latter surrendered. The independence of Texas was favored by the United States government, and many of Houston's soldiers had been openly enlisted in New Orleans.

SAN JOAQUIN (săn wă-kēn'), a river of California, which rises in the Sierra Nevada Mountains and, after a general course of 350 miles toward the northwest, joins the Sacramento at its entrance into Suisun Bay. It receives the water from Tulare Lake by the Kings River. Another tributary, the Merced, drains the famous Yosemite Valley. The San Joaquin valley is a large part of the fertile region of central California and produces vast quantities of cereals, grasses, and fruits.

SAN JOSÉ (hō-zā'), a city of California, county seat of Santa Clara County, fifty miles southeast of San Francisco. It is on the Central Pacific and the Southern Pacific railroads. The site is on a plateau between the Coyote and Guadalupe rivers, two small streams flowing into San Francisco Bay, which is about six miles from San José. It has a beautiful climate and is surrounded by a fertile fruit and farming country. The manufactures include leather, flour, canned fruits, wine, woolen goods, lumber products, and machinery.

Among the principal buildings are the county courthouse, the public library, the post office building, the high school, the State asylum for the insane, the State normal school, and the Academy of Notre Dame. Near it is the Lick Observatory. It is the seat of the University of the Pacific, a Methodist Episcopal institution. The city has gas and electric lighting, sanitary sewerage, public waterworks, and electric street railroads. It was founded in 1777 and a mission was established here in 1797. A small military force captured it for the United States in 1846. From 1849 to 1851 it was the capital of California. Population, 1900, 21,500; in 1920, 39,604.

SAN JOSÉ, the capital of Costa Rica, Central America, situated near the center of the state, on an elevated and fertile plain 3,775 feet above sea level. It is connected by railway with the coasts of the Caribbean Sea and Pacific Ocean, Limón being the terminus on the former and Punta Arenas on the latter. The principal buildings include a cathedral, the bishop's palace, the government buildings, and a university. Most of the streets are narrow, but within recent years notable improvements have been made and its trade has been enlarged materially. The city has a public school system, a medical college, a museum, and a number of parks. San José has been the capital of Costa Rica since 1823, in which year it was removed from Cartago. Population, 30,130.

SAN JUAN (hōō-än'), the capital of Porto Rico, situated on a peninsula on the north side of the Gulf of San Juan. It has one of the finest harbors in the West Indies, and is the seat of an extensive trade in native products and imports. Railroad connections afford adequate communication with the interior. It has many important steamship and submerged telegraph lines. The streets are improved by electric lighting, stone and macadam pavements, and rapid transit. Among the manufactures are sugar, tobacco products, clothing, soap, spirituous liquors, utensils, and machinery. The noteworthy buildings include the city hall, the government building, the theater, the public library, the military hospital, the cathedral, and the Jesuit College. A statue of Ponce de León is located on the Plaza de Santiago. Morro Castle, built in 1584, is situated on a promontory in the western part of the city. The city was founded in 1521 by Ponce de León. It was bombarded by the Dutch in 1625 and in 1898 it became a possession of the United States. Population, 1920, 48,716.

SAN JUAN, a river of Central America, which is important because of its location on the route of the proposed Nicaragua Canal. It is the outlet of Lake Nicaragua and flows toward the south and east for about two-thirds of its length, when it makes a bold turn toward the northeast and enters the Caribbean Sea a short distance south of Greytown. The entire length is about 115 miles, but only about one-half of its lower course is serviceable in the canal. In 1529 Diego Machuca sailed down the river from Nicaragua Lake, this being the first time that it was navigated.

SAN JUAN ISLANDS, an archipelago in the Gulf of Georgia, lying between the mainland and Vancouver Island. They constitute San Juan County, in the State of Washington. The principal islands are San Juan and Orcas. Friday Harbor is the chief town and county seat. They were a source of dispute between the United States and Canada for some time after concluding the treaty of 1846. The United States contended that the boundary extends through the middle of the Canal de Haro, which separates the islands from Vancouver Island, while Great Britain maintained that the boundary is through Rosario Strait. In 1871 the controversy was referred to the Emperor of Germany, who rendered a decision in favor of the United States.

SANKEY (săn'kī), **Ira David**, evangelist, born in Edinburg, Pa., Aug. 28, 1840; died Aug. 13, 1908. His father, David Sankey, was an editor and banker and for many years held the office of State senator. At an early age he displayed much fondness for music. In 1855 he became leader of the Methodist Church choir in Newcastle, Pa., of which he was a member. He attended a convention of the Young Men's Christian Association at Indianapolis, in 1870,

where he met Dwight L. Moody and joined him in his evangelical work. His voice being a fine baritone, he became prominent as a valuable auxiliary to the evangelical work of Moody. In the later years of his life he became almost totally blind. He published "Sacred Songs and Solos," "Gospel Hymns," and "Winnowed Songs for Sunday Schools." His best known songs include "Throw Out the Life Line," "Pull for the Shore, Sailor," and "The Ninety and Nine."

SAN LUIS OBISPO, county seat of San Luis Obispo County, Cal., 145 miles northwest of Los Angeles, on the Southern Pacific and other railroads. The surrounding country produces live stock, cereals, and dairy products. It has a large trade. The features include the courthouse, high school, and public library. It was settled in 1772. Population, 1920, 5,895.

SAN LUIS POTOSI (săn lōō-ēs' pō-tō-sē'), a city of Mexico, capital of a state of the same name, 360 miles northwest of the City of Mexico. The site is on a fertile tableland 6,375 feet above sea level. In the vicinity are productive gold and silver mines and large smelting works are located here. It was founded in 1586, but its prosperity is due largely to the mines and railroad traffic. Population, 1918, 83,480.

SAN MARINO (mă-rē'nō), an independent republic in Europe, situated on the eastern slope of the Apennines, about forty miles southeast of Ravenna, Italy. It is entirely encircled by provinces formerly belonging to the papal states, but which are now included in Italy. The area is 38 square miles. It is a hilly district, the highest point, Monte Titano, being 2,650 feet above the sea. The climate is healthful, but the country is somewhat windy and subject to frequent rains. Farming, fruit culture, and stock breeding are the principal occupations. San Marino is the capital. It is reached only by a wagon road and has narrow streets. A museum, several government buildings, and five churches are among the noteworthy structures.

The government is by a grand council of sixty members, of whom twenty are nobles; twenty, burgesses; and twenty, rural landowners, who are selected by the grand council and serve for life. The executive authority is vested in two captain regents, who are chosen by the grand council and each holds office for six months. The army consists of 950 men. San Marino was recognized as an independent republic by the Pope in 1631, and ever since its independence has been guarded with remarkable zeal by the inhabitants. In 1862 it placed itself under the protection of Italy, and in 1915 declared war upon Austria-Hungary. Population, 1906, 11,439; in 1920, 10,489.

SAN MARTIN (săn mār-tēn'), **José de**, soldier, born at Yapeyu, Argentina, Feb. 25, 1778; died Aug. 17, 1850. He studied in Spain and served in the army against France. In 1811 he went over to the Revolutionists and

sailed for Buenos Ayres, where he was made commander of a regiment of cavalry. He defeated the Spanish at San Lorenzo and in 1814 commanded the insurgent army of Peru. In 1818 he joined the movement for independence in Chile, where a republic was established, and in 1821 took part in proclaiming the independence of Peru. The following year he resigned his command and sailed to Europe, after which the task of conquering the country was left to Bolivar.

SAN MICHELI (sän mē-kā'lē), **Michele**, architect, born in Verona, Italy, 1484; died in 1559. He worked in Rome, where he met Michel Angelo. The Pompeii Palace in Verona is his masterpiece.

SAN RAFAEL, capital of Marion County, Cal., 15 miles north of San Francisco, on San Pablo Strait and on the Northwestern Pacific Railroad. It has creameries, printing offices, and a Dominican convent. The features include the courthouse, high school, and public library. It was settled in 1840. Population, 1920, 5,512.

SAN SALVADOR (säl-vā-dōr'), a city of Central America, capital of the republic of Salvador, located 105 miles southeast of Guatemala. It is situated in the center of a rich farming country and has a large inland trade, but its architecture is mostly of wood and brick. The most noted buildings include the national palace, a normal school, a university, a cathedral, and the national theater. Near the city is the extinct volcano of San Salvador, height 8,365 feet. It has a large trade in grain, sugar, tobacco, and indigo. The Spaniards founded the city in 1528. In 1854 it had many splendid buildings, but on April 6 of that year a destructive earthquake completely destroyed it. Soon after it was rebuilt. Several of the new buildings are fine structures. Population, 1918, 59,568.

SANS-CULOTTE (sänz-kū-lōt'), a word meaning without breeches. It was applied in France by the court party at the outbreak of the Revolution to the advocates of democratic principles. This designation first arose from the circumstance that the Revolutionists adopted the use of trousers or pantaloons instead of the knee breeches then in fashion, and was applied in a spirit of reproach. The advocates of democracy soon turned the term to good use, applying it to themselves as patriots, and it was long a distinction between them and the court party, but toward the close of the convention fell into disuse.

SANSKRIT (sän'skrīt), the oldest of the Aryan or Indo-European languages. It bears the same relation to the Aryan languages that Latin does to the Romance tongues. Sanskrit is still cultivated as a classical language and is the sacred language of the Brahmans. There is a resemblance between it and the Greek in that both are highly inflected. However, it holds a higher rank of value to philologists, since philology did not assume the importance of a science

until Sanskrit became known to the Europeans. The word Sanskrit is applied only to the symmetrically formed language preserved in the classical and sacred writings of the Hindus, the word meaning *carefully constructed*. In this sense it stands opposed to *Prakrit*; that is, natural or common, the Sanskrit dialect spoken by the unlearned people, such as women and servants, in the Sanskrit dramas. The Prakrit is a branch of the southern division of Aryan languages and is the source of the vernaculars of modern India. It is thought that the Sanskrit never attained a wide use among the common people, but in its purity constituted the written and spoken form among the educated classes.

The Sanskrit alphabet has 14 vowels and diphthongs and 33 consonants, but to these are added several secondary characters. Among the peculiarities in Sanskrit grammar are its limited use of prepositions to govern nouns, but instead they occur as prefixes of verbs. Three genders are recognized, the masculine, feminine, and common; and three numbers, the singular, dual, and plural. The eight cases include nominative, accusative, instrumental, dative, ablative, locative, genitive, and vocative. Writers recognize a peculiar resemblance between it and the Greek, both languages being highly inflected, and there is a similarity in the forms of the verbs. Two distinct periods are recognized in the history of Sanskrit. The first epoch represents the use of the language as contained in the Vedic hymns, and the other embraces its use in the epic writings, the laws, and other later literature.

Literature. Sanskrit literature is made up of a large number of writings, the most important of which are of a religious character. It may be said that the literature begins with the *Vedas* and dates probably from 2000 to 1500 B. C. Four collections are included in the Vedic writings, which are looked upon as the source from which all sacred writings of the Hindus were drawn. These collections include the large work called *Rig-Veda*, the collection of verses known as *Sama-Veda*, the verses or sacrifices known as *Yujur-Veda*, and the edition known as *Atharva-Veda*. A later work or treatise relating to religious practice is called *Puranas*. The law literature is of next importance, including a treatise on religious and civil law known as *Dharma-Shastra*, which embraces additions relating to education, marriage, funeral rites, and the duties of teachers and officers. In the writings classed as epics are a number of interesting works, but the most important include the *Rāmāyana* and the *Mahābhārata*. The latter is a work of 220,000 lines and may be said to be the production of writers who flourished in different periods. It contains epic and lyric poems, mythical history, and philosophical investigations. The *Rāmāyana* embraces an account of Rama, a prince of Oude, whose heroic conquest of the Deccan and Ceylon is recounted.

The dramatic writings of the Hindus are inferior, when considered on a comparative basis with their works in other lines, which is partly due to the use of Prakrit when representing females and the lower characters, while the highest form of Sanskrit is employed in presenting the higher male characters. These writings are rich in fables, including the earlier collection known as *Panchatantra* and the later group of writings known as *Hitopadesha*. Many of these fables became current in the literature of all the Eastern peoples, and even reached a wide use among the people of Europe in the Middle Ages. Their works in history, music, anatomy, medicine, and architecture take a more or less important rank. It is particularly noteworthy that their writings in astronomy and arithmetic are of a high character, and include a treatise on the solar year, which they divided into 365 days. Their astronomer, Aryabhatta, affirmed the revolution of the earth on its axis, gave the true theory of the causes of solar and lunar eclipses, and observed the motion of the equinoxes and solstices.

In lexicography the Aryans had a number of works that embrace commentaries on words and trace many of them from their roots. Precision of language was a peculiar characteristic of their writers, which is evidenced by numerous works on grammar and prosody. The oldest work on Sanskrit grammar dates from the 3d century B. C., and is assigned to a writer named Panini. Many literary productions and treatises in the Sanskrit emanated from Buddhist and Brahman writers of recent date, though these writers employed modern forms of the language. It is made certain by inscriptions that Sanskrit in its purity ceased to be a spoken tongue at least 200 years before the Christian era.

SANTA ANA, capital of Orange County, Cal., 30 miles south of Los Angeles, on the Southern Pacific and other railroads. The surrounding country produces fruit and dairy products. It has a fine courthouse, high school, and public library. The place was settled in 1870 and incorporated in 1888. Population, 1910, 8,429; in 1920, 15,485.

SANTA ANA (sän'tä ä'nä), a city of Central America, in Salvador, near the Santa Ana River, capital of the department of Santa Ana. It has railroad connection with Acajutla, its seaport on the Pacific. It has a large trade in sugar, cereals, and fruits. The volcano of Santa Ana is ten miles southwest of the city; height, 6,625 feet. Population, 1919, 49,250.

SANTA ANNA, or **Santa Ana**, **Antonio Lopez de**, soldier and statesman, born in Jalapa, Mexico, Feb. 21, 1795; died June 20, 1876. He entered the Spanish army in 1810 and by 1821 attained the rank of lieutenant colonel, but in the same year he joined the revolutionary forces under General Iturbide, who made him governor of Vera Cruz with the military rank of brigadier general. The Spanish forces were driven from his territory and, when Emperor

Iturbide's government became oppressive, in 1822, he declared a republic, which every government except Spain recognized. The aristocratic faction incited a number of quarrels that caused a civil war.

Santa Anna not only quelled the disturbances with vigor, but defeated a body of Spanish soldiers at Tampico, and in 1832 became president of the republic.

His government adopted the policy of concentrating

power in the nation at the expense of the states, making the latter largely tributary, and in consequence Texas rebelled in 1836. Though at first highly successful in the war against Texas, he was finally defeated at San Jacinto by General Houston and was captured. Soon after his release Mexico was invaded by French troops, which landed at Vera Cruz in 1837, but Santa Anna charged them with great bravery and drove the invaders from the country. He was wounded in the left leg at Vera Cruz, which made it necessary to amputate the limb. In 1841 another revolution occurred, and he was appointed by the junta provisional president, serving in that capacity until 1845, when he was obliged to seek safety at Havana as an exile.

The war with the United States began in 1846. After the defeat of the Mexicans at Palo Alto, Resaca de la Palma, and Monterey, Santa Anna was recalled to take charge of the army and was made president. Soon after the defeat of Buena Vista and Cerro Gordo, it became certain that the capital would be captured and Santa Anna resigned the presidency and retired from Mexico. He was recalled in 1853 and made president, but was compelled to leave two years later and, when Maximilian became emperor, he returned under a written promise of loyalty to the empire. His intrigues to arouse the people against the government caused the emperor to order him from the country, when he took up his residence in the United States, but returned to Mexico in 1867 to make his final effort to secure control of the government. However, he was captured before landing at Vera Cruz and condemned to death, but President Juarez pardoned him on condition that he would leave the country. His residence was on Staten Island, New York, until 1875, when he returned to his native country. Santa Anna is regarded one of the ablest of Mexican generals and quelled civil wars with considerable success. Charles III.



GENERAL SANTA ANNA.

of Spain conferred upon him the Grand Cross, and the King of Prussia presented him the Cross of the Red Eagle.

SANTA BARBARA (săn'tà bär'bà-rà), a city in California, county seat of Santa Barbara County, on the Pacific coast, ninety miles northwest of Los Angeles. It is on the Southern Pacific and the California Northwestern railroads. The surrounding country produces grain, fruit, vegetables, and flowers. It is frequently called the "Newport of the Pacific," owing to its fine climate and picturesque location. The noteworthy buildings include the Potter Hotel, the public library, the county courthouse, the Anthony's College, the Blake Sanatorium, and the Saint Vincent's School. Among the manufactures are flour, beet sugar, canned fruits, earthenware, and machinery. It is lighted by gas and electricity, has street pavements, waterworks, and other municipal facilities. A mission was founded on the site of Santa Barbara, in 1780. It was incorporated as a city in 1874. Population, 1920, 19,441.

SANTA CLAUS (săn'tà kləz), the name of a friend of children, who, according to folklore, brings presents on Christmas eve. He is usually represented as an aged but jolly man who drives over the roads in a sleigh drawn by reindeer, and descends chimneys to fill with gifts the stockings hung up to receive them. It is said that he sometimes leaves a birch rod in the stocking of a naughty child. The name Santa Claus was derived from Saint Nicholas, the patron saint of children, and is of German origin, but the legend was first brought to America by Dutch settlers of New York. The feast was celebrated originally on Dec. 6 and that day is still observed in some parts of Germany, but it is now held generally on Christmas.

SANTA CRUZ (krōōs), a city of California, county seat of Santa Cruz County, on Monterey Bay, 72 miles southeast of San Francisco. It is on the Southern Pacific Railroad, at the mouth of the San Lorenzo River, and has steamship communication. The surrounding country is noted for the production of cereals, live stock, and fruits. In the vicinity are deposits of bitumen. Among the features are the county courthouse, the public high school, the city library, the public park, and the School of the Holy Cross. The chief manufactures include canned fruits, gunpowder, leather, paper, flour, lime, lumber products, and machinery. It has a fine beach for bathing, public waterworks, and systems of public lighting and sewerage. Franciscan monks founded a mission here in 1782. It was incorporated in 1874. Population, 1900, 5,659; in 1920, 10,917.

SANTA CRUZ, the capital and chief port of the Canary Islands, on the northeast coast of Tenerife. The harbor is the best in the Canary group, being protected by two moles, and furnishes safe anchorage for a large num-

ber of ships. The streets are broad and regularly platted, but most of the buildings have flat roofs. It has a large import and export trade and manufactures of wine, cochineal, and utensils. The city is defended by several forts. Population, 1920, 53,403.

SANTA CRUZ, a city of Bolivia, capital of the department of Santa Cruz, about 165 miles northeast of Sucre. It is situated in the valley of the Mamore River and is surrounded by a fertile country. In the vicinity are vast forests. Many of the buildings are of timber, but some are of stone and brick. It has a growing inland trade. Population, 1916, 15,988.

SANTA FÉ (fä) the capital of New Mexico, county seat of Santa Fé County, on the western slopes of the Rocky Mountains, about twenty miles east of the Rio Grande. Communication is furnished by the Denver and Rio Grande and the Atchison, Topeka and Santa Fé railroads. It occupies a fine site 6,825 feet above sea level, within sight of the foothills of the Rocky Mountains, and has a pleasant and healthful climate. The former town of low houses and narrow streets has given way to a new city with modern facilities. It has an extensive and growing trade and in its vicinity are valuable mines of gold, silver, zinc, lead, and copper. The climate is arid, thus making irrigation necessary for successful cultivation, but this means has been taken advantage of and many fine farms, orchards, and gardens are the result.

Santa Fé has a fine public school system and is the seat of a hospital, an orphan asylum, the Saint Michael's College, and the Romona School for Indian Girls. Other noteworthy buildings include the Federal building, the capitol, the penitentiary, the Cathedral of San Francisco, the Church of San Miguel, and the Loretto Convent. It has electric lighting, waterworks and sanitary sewerage.

The region was first visited by the Spaniards in 1542, when it contained an Indian town. Santa Fé was founded in 1605 and is one of the oldest cities in America. It became the capital of New Mexico in 1640, but was captured and burned by the Indians in 1680 and was recaptured in 1694. An American army under General Kearny occupied it in 1846. In 1851 it became the capital of New Mexico. It was held by the Confederates for a short time in 1862. The place was chartered as a city in 1890. Population, 1900, 5,603; in 1920, 7,236.

SANTA FÉ, a city of Argentina, capital of the province of Santa Fé, 230 miles northwest of Buenos Ayres. It occupies a low site at the junction of the Salado and Paraná rivers. The surrounding country produces fruits and cereals. It has an important railroad and river trade in timber, hides, and cereals. Shipbuilding is the principal industry. Among the manufactures are tile, macaroni, oil, clothing, and machinery. It has a Catholic cathedral, a Jesuits' college,

and several schools. The place was founded in 1573. Population, 1917, 33,845.

SANTA MAURA. See *Leucadia*.

SANTANDER (săn-tân-dâr'), a seaport city of northern Spain, capital of the province of Santander, on the Bay of Biscay. It has an excellent harbor, extensive steamboat and railroad facilities, and is the center of a large trade in cereals, fruits, live stock, and merchandise. Among the manufactures are sailcloth, chemicals, tobacco products, cured fish, leather, sugar, clothing, and machinery. The city is well built and is improved by numerous municipal facilities. It has waterworks, electric lighting, a cathedral, several parks, and a number of schools. Population, 1920, 65,209.

SANTA ROSA (rō'zà), a city in California, county seat of Sonoma County, 52 miles north of San Francisco, on the California Northwestern and the Southern Pacific railroads. It occupies a fine site on Santa Rosa Creek, has wide and well-graded streets, and is the center of a large trade in roses and nursery stock. The surrounding country produces fruits, cereals, and dairy products. Among the noteworthy buildings are the county courthouse, the public library, the Pacific Methodist College, the Ursuline Academy, and the Santa Rosa College for Ladies. The manufactures include wine, leather, canned fruit, cigars, flour, and machinery. It has systems of public waterworks, sewerage, and electric lighting. The place was settled in 1850 and incorporated in 1854. Population, 1900, 6,673; in 1920, 8,758.

SANTIAGO (săn-tê-ă'gō), the capital and largest city of Chile, in the province of Santiago, 90 miles southeast of Valparaíso. It occupies a fine site on the Mapocho River, which is elevated about 1,650 feet above sea level, but its buildings are mostly low, owing to occasional disturbances by earthquakes. The streets are regularly platted, intersecting each other at right angles. In the center of the city is the Plaza Independencia, a large square adorned with beautiful plants and a fine fountain. Around the square are the most important buildings, including a cathedral, the government building, and an archbishop's palace. Other structures of note include the mint, the cathedral, the opera house, the Exposition Palace, the University of Santiago, the national institute of secondary education, a musical conservatory, and a military school. The university has a fine museum, a library, and botanical gardens. It is attended by 1,000 students. The national library, founded in 1813, contains 75,000 volumes, including many valuable works relating to America. It has many academies, convents, and scientific and educational associations.

Santiago is surrounded by a district which has fine orchards of figs and other fruits and contains deposits of gold, silver, lead, and other minerals. Among the manufactures are wines, clothing, earthenware, furniture, machinery, and

tobacco products. The city has railroad connections with other trade emporiums. It is lighted by gas and electricity and has electric street railways, waterworks, pavements, sewerage, and a fine public park. The larger part of the trade is in the hands of foreigners and the commerce is largely through Valparaíso, its port on the Pacific. Pedro de Valdivia founded Santiago in 1541. In 1906 it was visited by a destructive earthquake, which caused much loss of life and destroyed property valued at \$10,000,000. Population, 1917, 378,462.

SANTIAGO, Battle of, a naval engagement of the Spanish-American War, which occurred on July 3, 1898, off the coast of Cuba. The American squadron was under command of Sampson and Schley, who had confined the Spanish squadron, commanded by Cervera, in the harbor of Santiago de Cuba. Lieutenant Hobson had previously sunk the collier *Merrimac* in the narrow channel to the harbor and the American army was completing the investment of the city. Cervera made a bold dash to escape on the morning of July 3, but was immediately attacked and pursued by the Americans under Schley. The fighting continued most of the day, but the Spanish lost 510 men killed and wounded and all of their vessels. One American was killed and ten were wounded.

SANTIAGO DE CUBA (kōō'vá), a seaport city of Cuba, on the Bay of Santiago de Cuba, capital of a province of the same name, in the southeastern part of the island. It has steamboat and railroad facilities and a well-defended harbor, which is accessible by the largest vessels. The city occupies a fine site on a hillside 150 feet above the bay. It has paved streets, electric and gas lighting, waterworks, rapid transit, and other municipal improvements. The noteworthy buildings include the government palace, the military hospital, the opera house, the cathedral, and the Hospital de Cardidad. Calle de Christina, extending along the water front, is the chief street. Nearly all the larger buildings face the Plaza de Armas, which contains beautiful trees and subtropical plants.

The city has a large trade and many industries. Among the manufactures are sugar, soap, leather, tobacco and cigars, spirituous liquors, lumber products, and machinery. In the vicinity are extensive copper mines and numerous orchards, vineyards, and tobacco and sugar plantations. It was founded in 1514 and is the oldest town of Cuba. For many years it was the capital city. On July 3, 1898, the American fleet destroyed the Spanish squadron near Santiago. The city was defended by a Spanish force under General Toral, but capitulated and was occupied by American troops on July 17 of the same year. Population, 1921, 58,544.

SANTO DOMINGO. See *San Domingo*.
SANTOS (săn'tōsh), a seaport city of

Brazil, in the state of São Paulo, 25 miles south of the city of São Paulo, with which it is connected by a railway. The streets are well graded and paved, mostly with macadam, and it has a number of fine parks and boulevards. It has a spacious harbor and a large trade in coffee, wheat, sugar, and fruits. As a coffee-exporting port it takes rank among the most important in the world. Electric and gas lighting, waterworks, and a public library are among the utilities. It has manufactures of clothing, utensils, tobacco products, and machinery. The place was founded in 1539. Population, 1916, 41,084.

SANTOS-DUMONT, Albert, aéronaut, born in São Paulo, Brazil, July 20, 1873. His father, a wealthy coffee planter, gave him the advantage of a careful education. After attending several institutions in Rio de Janeiro, he spent two years in Europe, where he acquired proficiency in the use of French and English. He visited the United States in 1894 and soon after turned his attention to aéronautics. Besides making a number of memorable ascensions, he experimented with a dirigible balloon. In 1901 he was awarded a cash prize of £10,000, which had been offered by M. Henri Deutsch to the first aéronaut who would make a voyage around Eiffel tower. His experiments at the Louisiana Purchase Exposition in 1904 with the dirigible balloon were not entirely satisfactory, but he made a number of successful ascensions and long voyages both before and since. In 1904 he published "My Airships: A Story of My Life."

SÃO FRANCISCO (soun frân-sēsh'kōō), a river of eastern Brazil, which rises in the province of Minas Geraes. It has a general northeasterly course to Quebrobo, where it assumes a course toward the southeast and flows into the Atlantic. It flows through a large part of the Brazilian Highlands and in its upper regions are the celebrated Brazilian diamond fields. The entire length is 1,750 miles. It is navigable for large vessels to the Falls of Paulo Affonso, a distance of 140 miles from its mouth. These falls are 275 feet high and may be classed among the most remarkable of America. The river is navigable for 900 miles above the falls.

SAÔNE (sōn), a river in the eastern part of France, the largest tributary of the Rhone. It rises in the department of Vosges and joins the Rhone at Lyons, after a course of 290 miles. The chief tributaries are the Ognon and the Doubs. Canals connect it with the Moselle, the Loire, the Rhine, and the Seine. It is navigable for a distance of 190 miles.

SAO PAULO (soun pou'lōō), a city of Brazil, capital of a state of the same name, 250 miles southwest of Rio de Janeiro. It occupies a fine site on a plain near the source of the Rio Tiete, a tributary of the Rio Paranaíba. The surrounding country is noted for its fertility and has fine forests and deposits of precious metals and gems. It has a large trade in coffee, live

stock, tobacco, sugar, rice, millet, and dairy products. The manufactures include furniture, cotton and woolen goods, leather, vehicles, soap, utensils, and machinery. Among the important buildings are the Ypiranga Palace, the government house, the cathedral, the Jesuit College, and many parochial schools. The state of São Paulo is colonized largely by Europeans, including many Germans and Italians. The city was founded by Jesuits in 1552. Population, 1917, 502,436.

SAP, the liquid found in growing plants, which serves functions in plant life as important as blood does in animals. In it take place the changes necessary for vegetable growth. It is formed by the roots as crude sap from materials taken up from the soil. After passing from cell to cell by a process known as *endosmose*, it ascends to the leaves. There it undergoes chemical changes through the influence of light, especially the absorption of carbon dioxide from the air and the formation of sap elements. It now takes the name of *elaborated sap* and descends mainly through the bark, forming on its downward course the new growth to build up the plant. The ascent is with great rapidity in a zigzag course, but it is most copious in the spring, while at the beginning of winter it ceases entirely. The movement of sap in trees is one of the early signs of the return of spring in temperate and cold zones. Many plants yield sap that is of value in medicine and the industries, such as the maple, the beet, and the sugar-cane, which furnish the world's supply of sugar.

SAPAJOU (săp'ă-jōō), or **Sajou**, the name given to a group of monkeys native to America, which includes the largest and most intelligent species. They have a prehensile tail, the under surface of which is naked. The color is light brown, but the forehead is white. They live in bands, frequently from 40 to 50, and are able to leap long distances in passing from tree to tree. The largest are 45 inches long, including the tail, which is 20 inches. Their food consists of fruits, insects, and the tender shoots of plants.

SAPPHIRE (săf'ir), a precious stone of the corundum kind, next in value and hardness to the diamond. The ruby is a reddish-colored stone of the same kind, while the sapphire is a transparent species of a blue color, but there are sapphires of variegated colors. The topaz is a yellow sapphire, the amethyst is a violet, and the emerald is a green. Other species are colorless, striped, or milky. Sapphire occurs crystallized in six-sided prisms, with six-sided pyramidal ends. The most valuable specimens are produced in Ceylon, Bohemia, Burmah, and Persia. Several species are obtained in the United States, Germany, and Australia. The value of sapphires depends upon the color and transparency.

SAPPHO (săf'fō), eminent Greek poetess, born at Mitylene, on the island of Lesbos, and lived about 600 B. C. Few events of her life have

passed down in history, but it is generally thought that her father died when she was six years old. Grecian literature makes it certain that she lived at the same time that Alcaeus,



SAPPHO.

Pittacus, and Stesichorus flourished. She resided as a refugee in Sicily from 604 to 592 B. C., where she practiced the art of poetry and attracted the attention of many female pupils. After returning to Mitylene, she became the center of a coterie made up of females who had been her students in fashion and poetry.

Her writings consist chiefly of songs of love. She is placed by Aristotle in the same rank with Homer. Plato spoke of her as the tenth Muse. It is said that one of her poems so affected Solon that he prayed the gods to preserve his life until he had found time to commit it to memory. Her writings were intended to elevate her countrywomen, and all of them were remarkable for their intense and brilliant style and beauty of imagery. Only two of her odes are extant, one of which is a beautiful poem devoted to Venus, the goddess of love and beauty.

SARACEN (sär'ä-sën), meaning Oriental or Eastern, the name first applied by Pliny to the Bedouin Arabs who inhabited Mesopotamia. Later it became gradually extended in meaning to include the inhabitants of the Syro-Arabian desert, who harassed the frontiers of the Roman Empire, and still later it was given to any Mohammedan enemy of the Christians. In the latter sense it was applied to those who embraced the doctrine of Mohammedan and held it to be their duty to spread the Moslem faith everywhere, which in fact meant to conquer the whole world. To accomplish this purpose they resisted the Crusades and made many invasions of Europe, giving men a threefold choice,—the Koran, tribute, or the sword.

The Saracens originated a style of architecture peculiar to themselves, of which representative specimens are still abundant in Southern Europe. It is spoken of generally as Arabian architecture in Asia and Egypt, and as Moorish in Spain. The finest specimens of Saracenic architecture in Asia are found in the public buildings erected in Persia by Shah Abbas, in the early part of the 17th century. These include the magnificent mosque known as Mesjid Shah, a structure 223 feet long and 130 feet wide. It is crowned by a double dome 165 feet high. The most noted specimen in Africa is the beautiful mosque built by Ibn Tooloon in 876 A. D., at Cairo, Egypt. Another fine specimen near Cairo is the mosque and tomb of Kaid Bey, completed in 1463. See **Moors**.

SARAGOSSA (sär-ä-gös'sä), a city of Spain, capital of the province of Saragossa, on the Ebro River, 175 miles northeast of Madrid. It has ample railroad facilities and is important as a trade and manufacturing center. The city is divided into two parts by the river, which is crossed by a stone bridge which dates from 1437. Most of the streets are narrow and tortuous and many of the buildings are low, but it has a number of structures of historic interest. Among them are two cathedrals, known as El Pilar and La Seo, the former dating from 1677 and the latter, a Gothic structure, was completed in the 13th century. The university was founded in 1474 and was once an institution of wide fame. At present it has 800 students and a library of 20,000 volumes. Other noted institutions include several hospitals, a museum, a townhouse, and an exchange. The Moorish citadel, called the Aljaferia, formerly served as a palace for the kings of Aragon, but later became connected with the Inquisition. Among the manufactures are leather, silk and cotton textiles, utensils, vehicles, cigars, and clothing.

Saragossa is an attraction for pilgrims from many parts of the Spanish world, who come here to witness the image of the Virgin, a fine figure in one of the cathedrals. The place is an ancient city, dating from a remote period. Its present name was applied in honor of Caesar Augustus in 25 B. C. The Romans made it an important trade center, but it was captured by the Moors in the 8th century. Alfonso of Aragon captured it in 1118, after which it remained the capital of the kingdom of Aragon for some time. The French besieged it in 1808 and 1809, during which time many perished. It was then that a woman named Augustina snatched the match from the hands of a dying cannoner and fired his cannon at the enemy. She is known as the *Maid of Saragossa* and her fame has been extended by the writings of Southey and Byron. Population, 1920, 105,788.

SARATOGA (sär-ä-tō'gä), **Battle of**, an important engagement of the American Revolution. It occurred near Saratoga Springs, N. Y., on Oct. 7, 1777, and is classed by Creasy as one of the "Fifteen Decisive Battles of the World." The Continental army had been victorious at Bennington and was daily increasing its strength, while the British under Burgoyne were awaiting help from General Howe. General Gates held a strong position at Bemis Heights, which Burgoyne decided to storm, but in this he was thwarted by the prompt and vigorous action of Benedict Arnold, who led a furious opposition with 3,000 men. The battle ended at dark without decisive results, and on the 9th Burgoyne fell back to Saratoga, where his supplies were cut off and he was besieged by the Continentals under General Gates. After several light skirmishes, Burgoyne decided to surrender, which he did on the 17th, with the understanding that he and his men were not to serve against the

Americans again. The Continentals secured 5,804 prisoners, 4,650 muskets, and 42 guns. A beautiful obelisk 155 feet high is located 12 miles east of Saratoga Springs, on a bluff near the Hudson, which was the scene of the principal engagement.

SARATOGA SPRINGS, a village of New York, in Saratoga County, 38 miles north of Albany, on the Boston and Maine and the Delaware and Hudson railroads. It is one of the most noted watering places of the United States. In its vicinity are many mineral springs. Fashionable and convenient cottages and hotels are abundant. The prevailing character of the water is cathartic and it is bottled and shipped in large quantities. About five miles from the city is Saratoga Lake, to which an electric railroad extends. Among the noteworthy buildings are the public library, the State armory, the Convention Hall, the Athenaeum, the Saint Faith School, and the Saint Christina Home for Orphans. Large quantities of mineral waters are bottled and shipped. The manufactures include clothing, machinery, cigars, and earthenware. It has a growing trade in fruits and merchandise. The place was settled in 1773 and General Schuyler erected a fort here in 1777, but the village was not chartered until 1834. Population, 1920, 13,181.

SARATOV (sà-rä'tõf), or **Saratoff**, a city of Russia, capital of the government of Saratov, on the Volga River, 460 miles southeast of Moscow. It is a commercial and manufacturing center, has steamboat and railroad facilities, and is surrounded by a fertile farming and fruit-growing country. The site of the city is on the east side of the Volga, where it stretches over a rolling tract of land. Many of the streets are improved by pavements, gas and electric lighting, rapid transit, waterworks, and beautiful gardens and parks. Among the principal buildings are two cathedrals, a museum, the government buildings, and several excellent high schools, colleges, and hospitals. The manufactures include woolen textiles, cotton and silk goods, cordage, pottery, tobacco products, furniture, chemicals, leather, clothing, and machinery. The exports consist principally of corn, tobacco, hemp, flax, and live stock. Population, 1921, 198,508.

SARCOPHAGUS (sär-kõf'ä-güs), a stone coffin or tomb, employed to inclose a dead body. The wealthy classes of Egypt were the first to use sarcophagi, but later the practice extended to the inhabitants of the region of Asia bordering on the Mediterranean Sea, particularly to the Phoenicians, Carthaginians, Persians, Grecians, and Romans. Many of these structures were decorated and ornamented with elaborate carvings and inscriptions. The most beautiful specimens were found in the Egyptian pyramids. Coffins of stone have been used to some extent for royal or distinguished persons even in modern times.

SARD, a reddish-brown species of chalcedony, distinguished from carnelian by the deep-

ness of its color. When held between the eye and the light, it has a flesh-red color. The ancients prized it highly as a gem, and early writers credit it with having virtue in cheering the heart and encouraging the intellect. See **Chalcedony**.

SARDANAPALUS (sär-dä-nä-pä'lüs), the Greek name of a number of kings of Assyria, one of whom was the last king of the Assyrian empire of Nineveh. The Greek writer Ctesias described him in terms that have made his name proverbial as the type of luxury. His oppression caused a Median satrap named Arbaces to join a native revolution against him in 785 B. C. This resulted in his army being defeated and withdrawn into Nineveh, where he was besieged for two years. When it became apparent that resistance was in vain, he gathered his vast treasures in his palace and set them on fire, both he and his numerous wives perishing in the flames. It is thought by some writers that the account given by Ctesias is not historical, and that the name is a corruption of Assurbanipal.

SARDINE (sär'dën), a class of small fishes, belonging to the same genus as the herring and the pilchard, much valued as food. They are mostly canned in oil. This is done after salting and partly drying by pouring hot olive oil, or oil and butter, over them and sealing in a tin can. The young of the herring and menhaden are preserved in the same way in Canada and the United States. Sardines are abundant in the Mediterranean and off the western coast of Europe, where they are caught and canned in large quantities. Anchovied sardines are those preserved in red wine.

SARDINIA (sär-dĩn'ĩ-ä), an island in the Mediterranean, lying south of Corsica. Next to Sicily it is the largest of the Mediterranean islands. It is separated from Corsica by the Strait of Bonifacio, a channel about seven miles wide, and its shores are indented by numerous gulfs, including the gulfs of Asinara, Oristano, Palmas, Cagliari, and Orosei. The length from north to south is 155 miles; the width, 70 miles; and the area, 9,294 square miles.

DESCRIPTION. Several mountain groups characterize different parts of the island. The most elevated peaks are in the eastern part. Many of them are chiefly of granite formations. Mount Gennargentu, height 6,225 feet, is one of the highest peaks. The coasts are generally steep and rugged and near the shore are a number of small islands, but they are mostly off the northern and western coasts. Sardinia has an abundance of drainage, the most important rivers including the Coghinas, flowing into the Gulf of Asinara in the north; the Tirso, flowing into the Gulf of Oristano in the west; and the Flumene, flowing into the Mediterranean on the east. The climate is mild, with a temperature ranging from 30° to 90°, and it has an amplitude of rainfall. Both the climate and rainfall vary somewhat on account of elevation, but it may be said

that the most pleasant weather is experienced in autumn.

INDUSTRIES. The soil is generally fertile, especially in the valleys and coast regions, and there are an abundance of timber, fine fisheries, and valuable deposits of minerals. Among the mineral productions are sulphates of iron and copper, arsenic, nickel, cobalt, silver, zinc, antimony, lead, quicksilver, granite, and limestone. Agriculture is the principal occupation, though mining, manufacturing, and fishing have been developed considerably. The principal soil products include maize, wheat, beans, barley, tobacco, hemp, vegetables, flax, oranges, lemons, and many other fruits. The fisheries yield sardines, tunny, anchovies, and coral. Cattle, horses, sheep, goats, and swine are reared profitably. Among the manufactures are cotton textiles, silk and woolen fabrics, clothing, hardware, machinery, furniture, and cured fish. Several railroad lines penetrate different parts of the island, the most important being the line built from the Gulf of Asinara to the Gulf of Cagliari, which touches the coast of the Gulf of Oristano.

GOVERNMENT AND INHABITANTS. Sardinia is now divided into the provinces of Sassari and Cagliari. The local government is the same as that of Italy, to which country it belongs. The people are a mixture of Italian and Spanish stock and somewhat resemble the Greeks. They are in a very backward state educationally. Fully 80 per cent. are unable to read or write. Public education may be said to be in a primitive condition, the schools being dominated largely by the clergy. The family feud, or *vendetta*, is still practiced, but to a more limited extent than in Corsica. Universities are located in Cagliari and Sassari and elementary schools and convents in the smaller towns. The religion is almost exclusively Roman Catholic. Cagliari, on the Gulf of Cagliari, is the capital and principal seaport. Other cities include Sassari, Tempio, Alghero, and Oristano. Population, 1917, 841,417.

HISTORY. The early history of Sardinia is wrapped in tradition, but it is reasonably certain that a high state of civilization was developed at the time of the greatest prosperity of Greece. It was known to the Greeks as Ichnusa. The Carthaginians conquered it about 480 B. C., and during their occupancy it became noted for its production of corn and fruits. It was made a Roman possession in 238 B. C. and was long noted as the granary of Rome. The Vandals, Goths, and Saracens successively conquered it after the fall of the Roman Empire, but the Eastern Empire recovered it in 534 A. D. Saracen invaders obtained a foothold a second time, but they were driven out by an allied army from Genoa and Pisa in 1299. The conquerors divided the island as two separate possessions. Shortly after it became a territory of the kings of Aragon and remained tributary to Spain until it was annexed by the British, in 1708. The Treaty of Utrecht, in 1713, transferred it to Austria, and

in 1720 it became a part of the kingdom of Sardinia under the house of Savoy. The history is merged into that of Italy from the ascension of Victor Emmanuel II. to the throne of United Italy.

SARDINIA, Kingdom of, formerly a kingdom of Europe, situated in the southern part of the continent. It was formed principally of the duchies of Savoy and Genoa, parts of Milan and Montferrat, the county of Nice, the principality of Piedmont, and the islands of Caprera and Sardinia. It had an area of 28,769 square miles and a population of 5,167,542. Victor Amadeus II., Duke of Savoy, in 1720 assumed the title of King of Sardinia. This he did in accordance with a treaty with Austria, which provided that he was to surrender Sicily and receive in exchange the island of Sardinia. The history of the kingdom is largely wrapped in the fortunes of war with Austria and other countries, and is important as bearing upon and forming the nucleus of the present kingdom of Italy. The last war of the kingdom was under Victor Emmanuel II., who formed an alliance with France against Austria in 1859. In 1861 he came into possession of all of Italy, except Rome and Venetia, and assumed the title of King of Italy instead of King of Sardinia. He added Venetia to the kingdom in 1866 and completed the union of Italy by annexing the papal states in 1870.

SARDIS (sär'dis), or **Sardes**, the name of an ancient city in Asia Minor, capital of Lydia, on the Pactolus River, about 45 miles east of Smyrna. The Greek writer Aeschylus made the first mention of the city. It was captured by the Cimmerians about 650 B. C. The greatest prosperity was reached in the reign of Croesus, who became its king about 568 B. C., when it was in possession of fabulous wealth and power. The importance of Sardis was due to its military strength, the fertility of the surrounding country, and its location on the highway leading from the interior of Asia to the Aegean coast. The Athenians burned it in 503 B. C., and after the Roman conquest it was made a provincial government. Sardis is mentioned in the book of Revelation (Rev. iii., 1-5). In profane history it is spoken of as the residence of both Xerxes and Cyrus the Great. Timour conquered it in 1402, when much of it was destroyed. The site is at present occupied by a dilapidated village called Sart.

SARDONYX (sär'dō-niks), a mineral of the quartz variety, so named because it contains layers of sard and white chalcedony. It is a kind of onyx and is used quite extensively in making brooches and other forms of jewelry. In some specimens the color is orange or reddish yellow, while in others it is red with white markings.

SARDOU (sär-dō'), **Victorien**, dramatist, born at Paris, France, Sept. 7, 1831; died Nov. 8, 1908. He descended from a family in humble circumstances and, after studying medicine

for some time, engaged in literary work, producing his first comedy in 1854. This proved a failure, but he continued industriously at work and finally attained recognition by producing several dramatic compositions. His plays at-



VICTORIEN SARDOU.

tracted the favorable notice of Sarah Bernhardt, who made them popular at several leading theaters, both in France and the United States. He was decorated with the Legion of Honor in 1863, and became a member of the French Academy in 1877. His comedies are

emotional and for the most part improbable, but they are full of witty dialogue and are calculated for rapid action. Among his most noted productions are "Uncle Sam," a satire on American society, "Daniel Rochat," "Scrap of Paper," "Women of Silence," "Dora," and "Diplomacy." He wrote three plays for Sarah Bernhardt, entitled "Theodora," "Fedora," and "La Tosca."

SARGENT (sär'jent), **Epes**, journalist and poet, born in Gloucester, Mass., Sept. 27, 1813; died Dec. 31, 1880. He studied in the schools of Boston and at Harvard University and subsequently engaged as editor and publisher of the *Boston Daily Advertiser*. In 1839 he took an editorial position with the *New York Mirror*, and afterward served in a similar position on the *Boston Evening Transcript*. Later he retired from newspaper work to engage as editor of a series of school books and wrote a number of biographies, poems, and dramas. His best biography is "Life of Henry Clay," his best known song, "Life on the Ocean Wave," and his most popular drama, "The Bird of Genoa." "Song of the Sea" is a favorite poetic production.

SARGENT, John Singer, painter, born in Florence, Italy, Jan. 12, 1856. He studied classics and painting at Florence, and in 1874 went to Paris as a pupil of Carolus Duran. In 1879 he exhibited "Neapolitan Children Bathing," which attracted much attention on account of its truthfulness to nature. He removed to London in 1884 and visited the United States in 1887 and several times afterward, residing while in America chiefly in Boston and New York. The highest medals and honors were awarded him at the Paris expositions of 1889 and 1900. He was a member of many noted associations and became an officer of the Legion of Honor in 1895. Among the best known of his paintings are "Hall of the Four Children," "Pageant of Religion," "Prophets," "Smoke of Ambergris," and "La Carmencita." He painted many portraits, including

those of Joseph Jefferson, Edwin Booth, President Roosevelt, Carolus Duran, and Henry Marquand.

SARGON (sär'gon), the name of several kings of Babylonian descent who reigned over Assyria. Sargon I. is assigned by most scholars to about 2800 B. C., who extended the dominion of his people far beyond the valley of the Euphrates. Sargon II. succeeded Shalmaneser IV. as King of Assyria in 722 B. C. He captured Samaria after a siege of three years and soon after subdued a revolt of the Medians and the Syrians. In 709 he subdued Babylon. At that time the Assyrian Empire extended to Cyprus and into Cilicia. In the meantime he devoted much energy to the construction of buildings and highways. He died in 705 B. C. and was succeeded by his son, Sennacherib.

SARMATIANS (sär-mā'shānz), a powerful race of nomadic people of Europe and Asia, who occupied the vast region lying in the vicinity of the Caspian, Black, and Baltic seas in the time of the Romans. It is thought that they were of Asiatic origin. Tradition makes them the descendants of the Amazons by fathers of Scythian birth. Their women became famous as warriors, and as such entered the campaign on horseback with lance and spear. At first composed of various tribes, they became amalgamated into a powerful nation, and in the 4th century B. C. made the Scythians tributary. No barbarian peoples were more formidable in harassing the Roman frontiers than they. It is probable that they were conquered by the Goths in the 4th century A. D. Much of the history of Sarmatia was recorded by Ptolemy, but the manner in which he speaks of the Slavs, Finns, Goths, and other peoples of a barbarian nature makes it certain that he applied the term quite loosely.

SARNIA (sär'nī-ā), a port city of Ontario, capital of Lambton County, opposite Port Huron, Mich., on the Saint Clair River and on the Grand Trunk and the Père Marquette railways. It has connection with Port Huron by a steam ferry and a railway tunnel under the river. The manufactures include malt liquors, woolen goods, machinery, leather, and agricultural implements. It is a port of entry and has a large lake trade. The chief buildings include the county courthouse, the high school, the public library, several banks and hotels, and a number of churches. Electric lighting and waterworks are among the municipal improvements. Population, 1921, 14,877.

SARPEDON (sär-pē'dŭn), in classical mythology, the son of Zeus and Europa. He fought with the Trojans at Troy, where he was distinguished for his courage against the Greeks, but was slain by Patroclus. His brothers, Sleep and Death, carried his body back to Lycia, where his kinsmen gave him honorable burial.

SARSAPARILLA (sär-sā-pā-ril'lā), the dried root or rootstalk of the smilax, a genus of shrubby climbing plants native to tropical America. The plants grow only in the presence

of an abundance of moisture, developing roots many feet long but remarkably slender. They are sold in the market as drugs, being used in the preparation of medicine. The drug is sold



SARSAPARILLA.

largely as a purifier of the blood, but its value for that purpose is overestimated.

SARTO (sär'tō), **Andrea del**, eminent Florentine painter, born in Florence, Italy, in 1487; died there, Jan. 22, 1531. He was the son of a tailor named Angelo Vannucci, but was named Del Sarto, meaning the tailor's son. After studying as a pupil of Pietro

di Cosimo, he became inspired with a love for fresco painting, which line includes his greatest achievements. Francis I. invited him to Paris in 1518, where he painted many excellent works, among them "Charity," now in the Louvre. After returning to Florence, he devoted himself to sacred subjects. The most noted of his works are "The Sacrifice of Abram," now in Dresden; "Madonna with Saints," in the Berlin Museum; "Last Supper;" "Contending Theologians;" and a series of frescoes from the life of John the Baptist.

SASKATCHEWAN (säs-käch'ë-wön), a river of Canada, which rises in the Rocky Mountains by two sources called the North and the South Saskatchewan. The two branches unite some distance below Prince Albert, in Saskatchewan, and flow east into Lake Winnipeg. The north branch is 815 miles long and the south branch, 775 miles. From their confluence to Lake Winnipeg the distance is 280 miles. In its course the Saskatchewan passes through Cedar Lake. The valley is a fertile region and contains extensive and valuable forests and vast deposits of salt, iron, coal, and other minerals. About 1,000 miles of navigable waterway are afforded and in the upper course are ample opportunities for utilizing water power. The river is frozen from the middle of November to the middle of April.

SASKATCHEWAN, a Province of the Dominion of Canada, located in the west central part. It is bounded on the north by Mackenzie, east by Keewatin and Manitoba, south by North Dakota and Montana, and west by Alberta. The northern boundary is 265 miles and the southern is 375 miles long. It has a length from north to south of 720 miles. In form it resembles an upright oblong, whose base rests upon the boundary line of the United States in latitude 49°, while its upper border lies in latitude 60°. The

area is 251,887 square miles, of which 27,112 square miles are water surface.

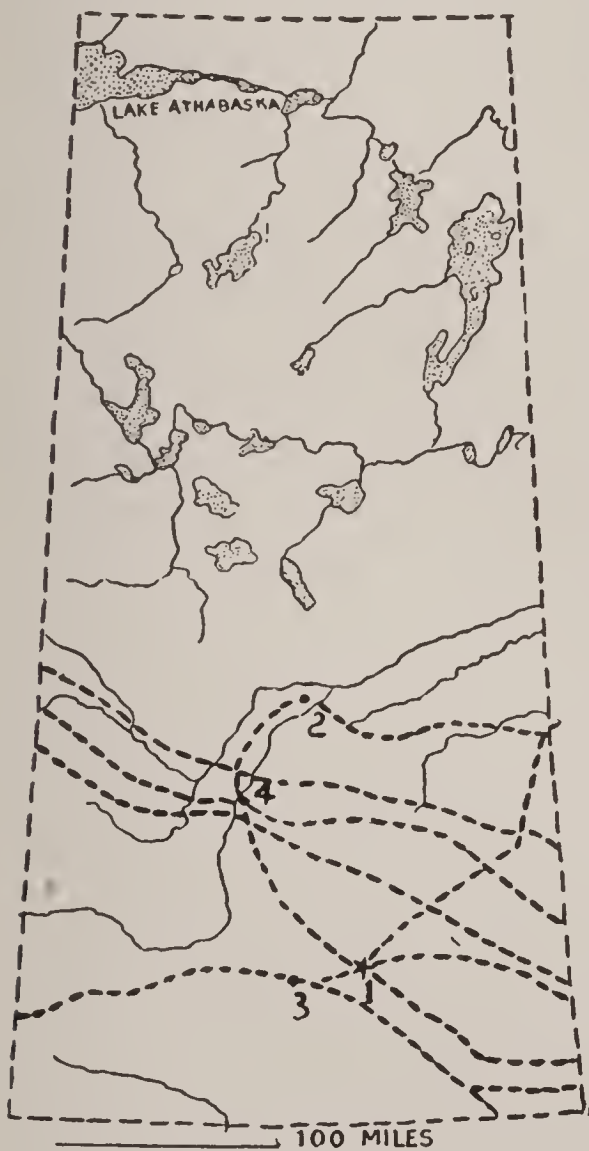
DESCRIPTION. The surface is diversified, but may be said to be generally of an undulating character, and includes the principal part of the great valley of the Saskatchewan River. Three belts of prairie steppes lie parallel to the Rocky Mountains, but are not very distinctly marked. The first of these crosses Manitoba and enters Saskatchewan, being a broken escarpment about 500 feet high, and in the west central part of the Province gives way to the forest belt of the north. It is pierced by the valley of the Red Deer River and extends toward the northwest as the Porcupine Mountains and Pasquia Hills. The second steppe, known in the United States as the Coteau du Missouri, extends in a northwesterly direction across the Province and into Alberta. It is about 200 miles wide, has an altitude of 1,600 feet above sea level, and is more or less broken into spurs and hills. Various names are applied in different parts, including Bear Hills, Eagle Hills, and Vermilion Hills. Moose Hills and Touchwood Hills, which belong to this escarpment, rise from 250 to 300 feet above the surrounding plains. In the southwestern part is the third steppe, which consists in part of a plain and in part of small plateaus. The general altitude ranges from 2,000 to 3,000 feet above the sea, being highest on the border of Alberta. All of the southern part of the Province may be described as a prairie country, which merges into a region broken by wooded areas in the central part, while the northern section is densely wooded with a valuable growth of timber.

The drainage belongs to four great basins, separated by low swells of ground. These basins include those of Lake Winnipeg and the Missouri, Churchill, and Mackenzie rivers. The southwestern part lies in the basin of the Missouri and is drained by French Creek and Wood River, both of which cross the southern border and enter the Missouri in Montana. Through the south central part flows the Saskatchewan, which rises in Alberta and flows entirely through the Province into Keewatin, where it discharges into Lake Winnipeg. The southeastern part is drained by the Souris or Mouse River, which makes a bold curve through North Dakota, thence enters Manitoba and joins the Assiniboine, which has its source in Saskatchewan. The Churchill drains a large section in the north central, flowing eastward through Keewatin into Hudson Bay. The northwestern part is drained through Lake Athabasca, on the border of Alberta, toward the northwest, hence the overflow reaches the Arctic Ocean through the Mackenzie River. Many lakes characterize the central and northern parts, all of which are rich in fish and surrounded by fine forests. Lake Athabasca, partly in Saskatchewan and partly in Alberta, is the largest sheet of water. Next in size is Wollaston Lake, in the northeastern part, and it is drained in two directions, one outlet leading

southward through Reindeer Lake and the Churchill and the other toward Lake Athabasca and the Mackenzie.

The climate is continental, being cold in winter and warm in summer. Rainfall is scant in the southern part, where it ranges from twelve to twenty inches, while the central and northern portions have an abundance of precipitation. However, the summers are favorable to the cultivation of crops in the southern part, where irrigation is employed to some extent, but the northern section is not adapted to general farming. Snow falls to a depth of one or two feet and the winters are long and cold, but quite clear. At Regina, in the south central part, the extremes range from 40° below zero to 90° above. Blizzards occur in the southern part during the winter, where the wind has a clear sweep across the prairies, but they are rare in the northern section.

AGRICULTURE. A large majority of the inhabitants are engaged in agricultural enterprises. It is estimated that 32,000 square miles are suitable for farming by irrigation, 86,500 square miles produce grain without artificial watering, and 106,000 square miles are adapted to ranching.



SASKATCHEWAN.

1, Regina; 2, Prince Albert; 3, Moose Jaw; 4, Saskatoon. Dotted lines indicate chief railroads.

These figures exclude the country that is now covered with timber and for that reason not suitable for cultivation at present. Farming is carried on most extensively on the fertile plains of the southern part, where large quantities of small grain are grown. Hard spring wheat is the principal crop and the yearly production ranges from 35,500,000 bushels to 55,500,000, depending upon rainfall and

other essentials of the growing season. Settlements have been extending with remarkable rapidity, hence the cultivated area is becoming greatly enlarged. Potatoes of a fine grade are grown with profit. Oats and barley produce

abundantly and hay yields good returns. Small fruit, such as grapes, currants, plums, and strawberries, are cultivated extensively and a northern variety of apples is grown with good results. Ranching is carried on most extensively in the south and southwest, where cattle sustain themselves almost the entire year on the open plains. Sheep and horses are grown in large numbers. Other products include flax, sugar beets, rye, and vegetables.

OTHER INDUSTRIES. Lumbering is an important enterprise in the northern part, where the forest wealth is enormous. Many species of the hardy northern woods abound, but pine and spruce predominate. These forests yield large returns for fuel and building purposes. Coal deposits, both bituminous and lignite, are widely distributed, but the latter is most abundant, being mined extensively for local purposes in many parts of the Missouri drainage basin. Iron deposits exist north of Lake Athabasca, but these are not worked at present. Limestone, granite, and clays are widely distributed.

Manufacturing is confined chiefly to products consumed locally and to the railway repair shops. However, there is a considerable output of lumber and lumber products for export. Dairying is receiving considerable attention and the butter and cheese produced are of a fine quality. Many flouring mills are operated and sugar is manufactured from sugar beets. Other manufactures include pottery, brick, furniture, and clothing. Large quantities of whitefish, pickerel, sturgeon, and other species of fish are found in the lakes, but the catches are used chiefly for local consumption.

COMMERCE AND TRANSPORTATION. Saskatchewan exports large quantities of barley, oats, flax, and cattle. Within recent years it has materially extended its exportation of flour and lumber. The imports consist principally of manufactured materials, such as clothing, foodstuffs, and farming machinery. Communication by the waterways extends a distance of 1,500 miles, being chiefly from Lake Winnipeg to the interior by the Saskatchewan and its tributaries. Additional transportation facilities are afforded by numerous lakes, many of which will ultimately be connected by a network of canals. The railway lines have a total of 6,125 miles. They include principally the Canadian Pacific, the Grand Trunk, both of which cross the Province from east to west, and the Canadian Northern Railway. These lines and others have branches to many interior points.

GOVERNMENT. The Lieutenant Governor is appointed by the Governor General of Canada and is assisted by an executive council, or responsible ministry, of four members, consisting of the premier, attorney general, commissioner of education and commissioner of agriculture. Legislative authority is vested in the assembly of one department, known as the Legislative Assembly, which is composed of 41 members

elected by the people. All native born and naturalized citizens may vote at the elections. The Lieutenant Governor receives a salary of \$9,000; the members of the executive council, \$5,000; and the members of the Legislative Assembly, \$1,000. Local government is administered by the officers of the counties, municipalities, and townships.

EDUCATION. A system of public schools is maintained for the free attendance of all persons who are of school age. The schools are supported partly through the sale of public lands and partly by local taxation. New schools may be organized by the settlers, but each school district, when so organized, must have not fewer than ten pupils. High schools and institutions of industry and higher learning are maintained in the cities. A commissioner of education has general charge of public education, but additional supervision is provided in the cities and counties. All the larger towns have inspectors of schools. The provincial university, established by the Legislative Assembly in 1908, is at the head of the educational system. A number of parochial and private denominational institutions are in a flourishing condition.

INHABITANTS. The southern part contains the larger number of inhabitants, while the northern section is at present almost entirely unoccupied, except by government officials and hunters. The greater number of people are of Canadian descent, but a large portion is made up of immigrants from the United States. Regina, in the southern part, is the capital. Moose Jaw, in the southwest, is an important distributing point. Prince Albert, on the Saskatchewan, is noted as a railway and commercial center. Other towns include Saskatoon, Indian Head, Moosomin, and Yorkton. In 1901 the Province had a population of 91,460. The rapid growth and development are evident by the fact that the population in 1921, 757,510.

HISTORY. Saskatchewan was first explored by French fur traders and they were succeeded by the employees of the Northwest Company, whose headquarters were at Montreal. The Hudson Bay Company took control of the region in 1821 and held it until 1869. Settlements began to be made by that time, but the early development was slow, owing to a lack of transportation facilities. Regina was made the seat of civil government in 1882. Louis Riel became the head of a rebellion in 1885, when about 35,000 Black Feet, Crees, and Ojibwas became dissatisfied through the destruction of the buffalo and other wild animals utilized for food. A number of these Indians and many half-breeds constituted a formidable force, which was met in a final battle by Canadian troops under General Middleton at Batoche on May 9th, where the rebels were defeated after an engagement lasting four days. Riel was captured, was tried for treason, and after due conviction was hanged. The government was that of a Territory until

1905, when it was admitted as a Province of the Dominion. It contains the larger part of the former districts of Assiniboia, Athabasca, and Saskatchewan.

SASKATOON, a city of Saskatchewan, on the Saskatchewan River and on the Canadian Northern, the Canadian Pacific, and the Grand Trunk Pacific railroads. It has manufactures of brick, mattresses, flour, and machinery. The retail and wholesale trade is very extensive. Among the features are the courthouse, high school, Carnegie library, and University of Saskatchewan. Population, 1921, 25,539.



SASSAFRAS.

SASSAFRAS (sās'sā-frās), an extensive genus of plants, several species of which are noted for the medicinal virtues of their roots. They are widely distributed from Canada to the Gulf, ranging in size from a large tree fifty feet in height to a small bush in the cold regions. The *sassafras-nut tree* of Brazil, the *plum-nutmeg tree* of Australia, and the *sassafras laurel* of California are allied species.

SATAN. See Devil.

SATELLITE (săt'ěl-līt), a celestial body attending upon and revolving around some planet. It is often spoken of as a *secondary planet*, while the body around which it revolves is called a *primary planet*. The earth's satellite is called the *moon*. It has been ascertained that the eclipses, inclinations, inequalities, and reciprocal attractions of the satellites of all the planets more or less distinctly correspond with that of the moon. While the earth has but one satellite, other planets have a larger number, but some of the planets are not attended by any. Neptune is accompanied by one; Mars, by two; Uranus, by six; Jupiter, by seven; and Saturn, by nine. It is supposed that Saturn's rings are composed of a multitude of satellites. The following table gives the more interesting facts in relation to the different satellites, but several of those referred to, as the unnamed satellite of Jupiter, were not generally admitted until recently:

NAME OF SATELLITE.	PLANET.	YEAR DISCOVERED.	DIAMETER IN MILES.	DISTANCE FROM PLANET.
Moon	Earth.....	2,160	238,818
Phobos	Mars	1877	7	5,900
Deimos	Mars	1877	5	14,600
Io	Jupiter	1610	2,352	261,000
Europa	Jupiter	1610	2,099	415,000
Ganymede	Jupiter	1610	3,436	664,000
Callisto	Jupiter	1610	2,929	1,167,000
Unnamed	Jupiter	1892	100
Mimas	Saturn.....	1789	600	117,000
Enceladus	Saturn.....	1789	800	157,000
Tethys.....	Saturn.....	1684	1,100	186,000
Dione	Saturn.....	1684	1,200	238,000
Rhea	Saturn.....	1672	1,500	332,000
Titan	Saturn.....	1655	3,500	771,000
Hyperion	Saturn.....	1848	500	934,000
Iapetus	Saturn.....	1674	2,000	2,225,000
Phoebe	Saturn.....	1898
Ariel	Uranus....	1854	500	120,000
Umbriel	Uranus....	1851	400	167,000
Titania	Uranus....	1787	1,000	273,000
Oberon	Uranus....	1787	800	365,000
Unnamed	Neptune...	1846	2,000	225,000

SATIN (săt'ín), a silk fabric of a close texture, made with an overshot woof and a glossy surface. The warp forms have a close and smooth surface, and, to obtain its luster, it is passed between heated cylinders. An interval of fifteen threads occurs in a full satin twill.

SATINWOOD, an ornamental wood obtained in the West and East Indies. It is one of the most highly prized light woods for cabinetwork. The best grades that come from the West Indies are lighter in color than those produced in the Asiatic islands, and are considered the most valuable. Several species of trees yield satinwood. The finest products secured in the West Indies are from the prickly ash, called *Bahama satinwood*. Satinwood has a close grain and is hard and durable. It is capable of taking a fine polish and is exported largely for furniture. In India it is used for building purposes, especially for floors in dwellings.

SATIRE (săt'ir), the employment of sarcasm, irony, or keen wit in attacking individuals, manners, or social or political movements. The Romans were the first to employ satire in holding wickedness and folly up to public ridicule and censure. Lucilius and Horace are generally regarded as the originators of satire, and toward the end of the republic it was used both in prose and verse. Lowell is the great master of satire in America. The leading English satirists are Byron, Pope, and Dryden, and the leading Germans, Goethe and Wieland. The sting of satirical writings lies in the discovery between the man spoken of as he appears to himself and the man as he appears to others.

SATOLLI (sà-tòl'lê), **Francesco**, prelate and diplomat of the Pope of Rome, born in Perugia, Italy, in 1841. After studying in the seminary of his native city under Joachim Pecci and Pope Leo XIII., he became chief assistant of that pontiff in promoting theological studies. Later he was made professor in the Roman

Seminary, but soon became Archbishop of Lepanto. In 1889 he was sent as a representative of the Pope to Baltimore, Md., where the centenary of the Roman Catholic hierarchy was celebrated, and he likewise represented the Holy See at the inauguration of the Catholic University in Washington, D. C. In 1893 he became apostolic delegate to the Roman Catholic Church in the United States. This appointment gave the church in America a form of autonomy, his power including the exercise of pontifical jurisdiction, limited only by appeal to the Pope. In 1896 he was made cardinal, being succeeded in the same year in the office of delegate by Sebastian Martinelli. He is the author of several works on theology and philosophy, including "A Course in Philosophy." He died Jan. 8, 1910.

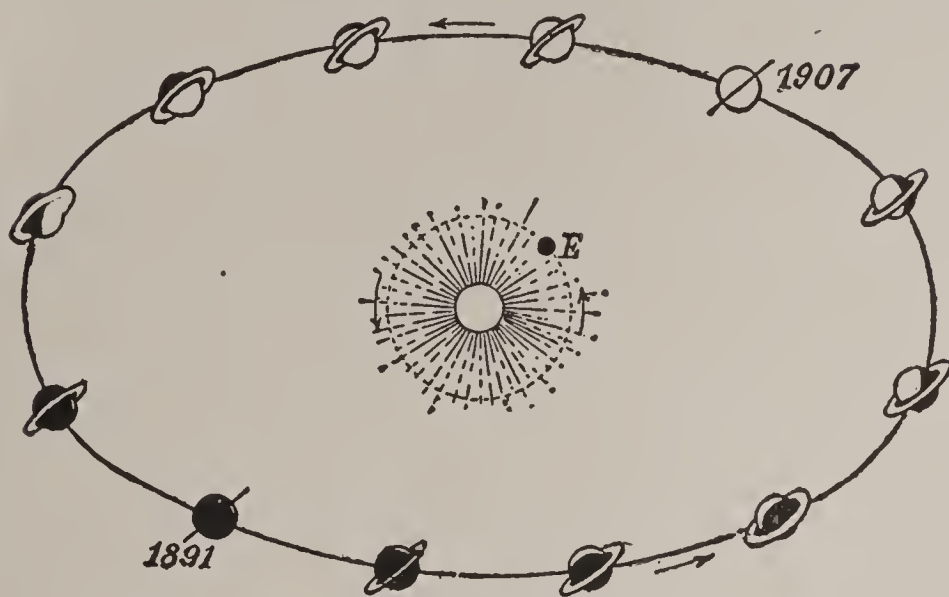
SATURDAY (săt'ür-dă), the seventh and last day of the week, so named from Saturn. It is the Sabbath of the Jews and several Christian denominations, including the Seventh Day Adventists and the Seventh Day Baptists.

SATURN (săt'ürn), a deity of ancient Italy. He is generally regarded by the Romans and modern writers as identical with Cronus, the god of time, in its sense of eternal duration, and of agriculture. He is represented as having married Rhea, daughter of Uranus and Gaea. His uneasy conscience made him fear that his children might some day rise up against his authority, as he himself had done in the case of his father, and, in order to render the prophecy impossible of fulfillment, he swallowed each child as it was born, greatly to the sorrow and indignation of his wife, Rhea. She resolved to save the sixth and last child, who was none other than Zeus, and did so by placing a stone in baby clothes, which Saturn swallowed in his eager haste without noticing the deception. The child was nourished, protected, and educated in Crete, and the stone which had counterfeited him was placed at Delphi, where it was long exhibited as a sacred relic.

When Zeus reached manhood he made war against Saturn and the Titans, and at length deprived his father of supreme power. The career of Saturn as a ruling Greek divinity ceases with his defeat, but like other gods he was supposed to be still in existence, and is by some writers connected with the government of Italy in the time of Janus, sharing sovereignty with the latter. The myth of Saturn swallowing his children is evidently intended by the poets to express the melancholy truth that time destroys all things. The reign of Janus and Saturn was so thoroughly peaceful and happy that it became known as the Golden Age. He was represented bearing a sickle in one hand and a wheat sheaf in the other. A temple was erected to him at the foot of the Capitoline Hill, in which were deposited the public treasures and laws of the state.

SATURN, one of the major planets, which is sixth in distance from the sun. It is the second

planet in size, being exceeded only by Jupiter, and has a mean diameter of 71,000 miles. It occupies the most remote position known to the ancients, shines with a feeble but steady pale-yellow light, and to the eye appears as large as a fixed star of the first magnitude. The polar diameter is about 68,000 miles and the equatorial, about 74,000. The movement upon its axis is with remarkable rapidity, making a complete revolution in 10 hrs. 4 min. 23.8 sec., thus having a day less than one-half as long as ours. However, its year is much longer, the time of a complete revolution around the sun being twenty-nine and a half earthly years. Its movement can



SATURN'S REVOLUTION AROUND THE SUN, SHOWING THE RINGS AS SEEN FROM THE EARTH AT DIFFERENT TIMES.

be noted by any careful observer, since it passes through about 12° of the sky in a year. The weight is estimated at about eighty times that of the earth, but its density is only one-eighth of the earth, being about equal to that of pine wood.

Saturn revolves about the sun at a mean distance of 886,000,000 miles, but as the earth and Saturn occupy different portions of their orbits, the distance between them at different times may vary 200,000,000 miles. Astronomers generally agree in stating that nine satellites attend Saturn, though some writers think even more, and it is surrounded by a system of rings. Some of the rings shine with a golden light and others are transparent. It is thought that the rings are composed of an immense multitude of small satellities, and that many of them resemble the meteors surrounding the sun. The nine satellites are named Tethys, Enceladus, Mimas, Dione, Rhea, Titan, Hyperion, Iapetus, and Phoeba.

SATURNALIA (săt-ŭr-nā'li-ă), a national festival of the Romans in honor of Saturn, celebrated after the gathering of the harvest, usually from Dec. 17 to 23. It was a time of universal cessation from labor, rejoicing, and merrymaking. No business was transacted, the courts were closed, friends sent presents to each other, and school children were given a holiday. Rome was flocked with crowds of people from the sur-

rounding country. All classes partook of the general exultation, giving themselves over to enjoyment, practical jokes, and general rejoicing. Social distinctions were for a time suspended, or even reversed. The Romans entered so heartily into the spirit of this festival that masters waited upon their slaves, the latter being dressed on these occasions in the garments of their superiors. The modern carnival now celebrated in Italy is a survival of the ancient Saturnalia.

SATYRS (să'tērz), in Greek legends, a race of woodland sprites, who personified the free life of the forest. They were generally represented as half human and half animal, the upper part being that of a human being and the lower that of an animal. Their appearance was both grotesque and repulsive, but their life was one of pleasure and self-indulgence, mostly given to the chase and wild music. At intervals they partook of wine and indulged in restful slumber. Both mortals and the gentle woodland nymphs dreaded them, mostly because of their reckless sports. They were represented in the train of Dionysius and were inseparably connected with his worship. Greek poets delighted to praise the innocent frolics of the little satyrs, and sculptors represented the older forms as nearly approaching human beings, but placed horns upon their heads and gave them the feet and legs of a goat. The Satyr of Praxiteles at Athens is a famous specimen of Greek sculpture. Pliny used the word to indicate a kind of ape.

SAUERKRAUT (sour'krout), an article of food prepared from cabbage. The cabbage is gathered when the heart is firm, cut into shreds, and packed with salt in a cask or barrel, where it is allowed to ferment under pressure. The addition of caraway seeds, juniper berries, and other condiments improves the taste. Sauerkraut was first made in Germany, but is now produced and sold in the markets of all countries of Europe and America having a temperate climate.

SAUL, the son of Kish, noted as the first King of Israel. His father was a wealthy chief of the tribe of Benjamin, and he was selected for the office by Samuel in response to the request of the Israelites for a king. Saul was a man of large stature and impervious character, and by his courage and military capacity soon won successes over the Philistines, Moabites, Ammonites, Edomites, and Amalekites. Later he became cruel in war and developed a most pronounced jealousy of his son-in-law, David, who was his attendant and the chief of his escort. Samuel was compelled to retire from his court and secretly anointed David as king, but did not cease to mourn for the monarch. Saul was defeated in a battle with the Philistines on Mount Gilboa and killed himself by falling upon

a sword. His reign extended from 1095 to 1056 B. C. He was succeeded by David.

SAUGUS (sə'gūs), a town of Massachusetts, in Essex County, eight miles north of Boston. It is on the Saugus River and the Boston and Maine Railroad, and is the residence of many Boston business men. The chief buildings include the townhall, the high school, several churches, and a library of 8,500 volumes. Woolen goods, brick, boots and shoes, spices, and machinery are among the manufactures. The place was incorporated in 1815. Population, 1905, 6,253; in 1920, 10,874.

SAULT SAINTE MARIE (sōō sānt mā'rī), a port city of Michigan, county seat of Chippewa County, on the Saint Mary's River, near Lake Superior. It is on the Duluth, South Shore and Atlantic, the Canadian Pacific, and the Minneapolis, Saint Paul and Sault Sainte Marie railroads and on the Sault Sainte Marie Canal. On the opposite side of the Saint Mary's River is the Canadian town of Sault Sainte Marie, with which it is connected by an international railroad bridge. Among the noteworthy buildings are the county courthouse, the public library, the high school, and a number of fine churches. Other features include Canal Park, Fort Brady, and an immense electric power plant. The manufactures include lumber, sailing vessels, machinery, tobacco and cigars, flour, furniture, leather, and hardware. It is the seat of a branch of the State fish hatchery and has a large trade in fish, lumber, and manufactures. Electric lighting, pavements, waterworks, and rapid transit are among the improvements. Extensive timber and minerals abound in the surrounding country. A mission was established here in 1641 by Jesuits, but the first permanent settlement was not made until 1662. It was incorporated in 1887. Population, 1904, 11,442; in 1920, 18,096.

SAULT SAINTE MARIE, a port of entry of Ontario, in Algoma County, on the Saint Mary's River. It is finely situated on the Saint Mary's Falls Canal and the Canadian Pacific and the Algoma Central railways, and is connected with the opposite side of the river by a bridge one mile long. The surrounding country is agricultural and has productive iron ore and copper mines. The principal buildings include the city hall, the high school, the public library, and the Cornwall and International hotels. Among the manufactures are steel rails, lumber products, and machinery. Electric lighting, waterworks, telephones, and sewerage are among the public utilities. Population, 1921, 21,092.

SAULT SAINTE MARIE CANAL, an important waterway of the United States, extending round the rapids of the Saint Mary's River at Sault Sainte Marie, Mich., and connecting Lake Superior with the Saint Mary's River. It is two-thirds of a mile long and has a fall of eighteen feet, which is overcome by two locks located side by side. These locks include the Poe lock, which is 21 feet deep, 100 feet

wide, and 800 feet long, and is the largest improvement of the kind in the world. The expense of construction was \$5,000,000. It has a larger traffic than the Suez Canal in Africa. A similar canal, but somewhat smaller, is located on the Canadian side. The latter canal carries a comparatively small per cent. of the traffic between Superior and the other waters of the Great Lakes.

SAURY PIKE (sə'rŷ pīk), a kind of fish belonging to the flying fishes, peculiar for its greatly prolonged body. It is covered with minute scales, has long jaws resembling a beak, and swims very near the surface, often leaping out of the water and gliding through the air for some distance. This habit, due largely to its seeking to escape the danger of attacks of larger fish and tortoises, has given it the name of *skipper*. Several species are native to American and European waters. The American saury pike is remarkable for its long, thin body. These fish are edible.

SAUSAGE (sə'sāj), an article of food prepared of chopped or minced meat. It is made of fat and lean meat mixed in varying proportions and is highly seasoned with salt and pepper. Some varieties are made of lean beef, which is mixed with a small quantity of fat pork and seasoned with sage or garlic, and is inclosed in a cylindrical case or skin made of the prepared intestine of some animal. Sausage is a by-product of markets and packing-houses, where trimmings of all sorts are used for the purpose. The meat is carefully chopped or minced by machinery, after which it is seasoned with salt and pepper, and machines are used to press the soft and pliable mass into skins. Stuffing machines consist of two cylinders, one for steam and the other for pressing the meat into the skins, which is done by means of a piston rod being worked by the piston rod of the steam cylinder. At the bottom of the stuffing cylinder is a tube, over which the sausage casings are slipped, and they are filled rapidly by the meat being forced through this orifice. The manufacture of sausage is one of the most profitable parts of the packing industry. The varieties of sausage are very numerous. In the United States the casings for sausages have an annual value of \$2,500,000 and the output of sausage is \$298,500,000.

SAVAGE (säv'āj), **Richard**, poet, born in London, England, Jan. 10, 1698; died July 31, 1743. He was an illegitimate son of Richard Savage, Lord Rivers, and the Countess of Macclesfield. He studied at the grammar school of Saint Albans and afterward became apprenticed to a shoemaker in Holbourn. When the secret of his birth was accidentally revealed to him, he quit his handicraft to turn his attention to literature. His first writings were comedies, but he is best known for his poetical works, which so impressed Lord Tyrconnel that he gave him an annual pension of \$1,000 for some years. Though

failing to become poet laureate after an earnest effort, he received a pension of \$250 from Queen Caroline. His best known writings include the poems entitled "Bastard" and "Wanderer." "Love in a Veil" and "Woman's a Riddle" are two well-known comedies. His tragedy of "Sir Thomas Overbury" is his best writing of that class. Dr. Johnson was much in his society and treated him favorably in his "Lives of the Poets."

SAVANNAH (sà-văn'à), a river of the United States, which rises near the southern boundary of North Carolina and, after a general course toward the southeast, flows into the Atlantic Ocean. It forms the boundary between South Carolina and Georgia, is 450 miles long, and is navigable for large vessels to the city of Savannah, eighteen miles from the sea, and for small steamboats to Augusta.

SAVANNAH, the second city of Georgia, county seat of Chatham County, on the Savannah River, 15 miles from the Atlantic. It occupies a commanding site about fifty feet above sea level and has transportation facilities by the Atlantic Coast Line, the Seaboard Air Line, the Southern, and other railways. The streets are broad and straight. They are paved largely with stone, asphalt, and macadam. Magnolias, catalpas, and japonicas beautify the streets and many of the squares, hence the city has been popularly named the *Forest City*. Forsyth Park, a tract of ten acres in the center of the city, is one of many beautiful resorts. The Parade Ground, in the southern part of the park, has a fine Confederate monument. About thirty squares are maintained in different sections of the city, many of which contain handsome monuments, including those of Count Casimir Pulaski, Nathanael Greene, William Jasper, and William Washington Gordon.

The architecture is, in general, modern and substantial. Among the leading public buildings are the county courthouse, the customhouse, the post office, the Union Passenger Station, the Masonic Temple, the City Exchange, the De Soto Hotel, and the public library. It has numerous church edifices of historical interest and maintains many ward and several high school buildings. Among the institutions are the Savannah Hospital, the Telfair Hospital for Women, the Saint Joseph's Hospital, and the Georgia Infirmary for Colored People. It is the seat of a Roman Catholic bishopric, the Jewish Synagogue of Mickva, and the Telfair Art Gallery. Bethesda Orphanage, founded by George Whitefield in 1740, is located about ten miles from the city. The Christ Church occupies the site on which John Wesley first preached to the colonists in America.

Savannah is located in a fertile region which produces large quantities of cotton, fruits, rice, sugar cane, and vegetables. It has an extensive coastwise and foreign trade, and is one of the largest cotton-shipping ports in the United States. The river is sufficiently deep to admit

the largest steamers and has been greatly improved by wharves and by dredging. It has large exports of rice, lumber, phosphate rock, cotton seed oil, tobacco, and turpentine. The manufactures include fertilizers, furniture, railroad cars, confectionery, pipe tobacco and cigars, locomotives, patent medicine, and clothing. Among the public utilities are extensive systems of waterworks, sewerage, and surface drainage. Intercommunication is provided by a system of electric railways, which has branch lines to all parts of the city and many points in the adjoining country.

James Edward Oglethorpe founded a settlement in the vicinity in 1733. A large number of German colonists settled in the vicinity during the next few years, and Charles and John Wesley arrived in 1735. It was occupied by the British in 1778, who compelled the Americans to surrender, and was held by them until the close of the Revolutionary War. In 1789 it was incorporated as a city. The *Savannah*, which was the first steamer to cross the Atlantic, was owned and constructed by people in the city. General Sherman captured Savannah in 1864, when completing his march to the sea. At that time it had a population of about 25,000. Although the navy yard and many buildings were destroyed, it was rebuilt with rapidity, and is at present one of the leading commercial cities of the South. Population, 1920, 87,252.

SAVE (säv), a river in Austria-Hungary, which rises in the southeastern part of that country, near the boundary of Italy. After a course of 550 miles toward the southeast, it joins the Danube near Belgrade. It separates Carniola from Styria, crosses Coatia, and separates Slavonia from Bosnia and Servia. The valley of the Save is highly fertile, producing large quantities of cereals and fruits. Among the principal tributaries are the Una, Drina, Bosna, and Kulpa rivers. It is navigable for 335 miles.

SAVINGS BANK, an institution for receiving and investing savings. The primary object of savings banks is to encourage thrift and the accumulation of earnings among the laboring, professional, and other classes. They pay interest on deposits at stated intervals, the interest depending on the rate of profit accruing to the bank from loaning the deposits. Savings banks originated in the latter part of the 18th century and were, in general, managed by persons seeking no remuneration for their services. The first banks of this kind in Europe were established in accordance with suggestions made by Daniel Defoe in 1697, when several small institutions were founded in England. Banks of a similar character were soon after instituted on the continent. The first large savings bank was established at Brumath, France, in 1765; another at Hamburg, Germany, in 1778; one at Berne, Switzerland, in 1787; and the first large institution of this kind in England, in 1799. These

particular banks and others of a similar kind furnish depositors an opportunity to place small savings at interest, and the state is the direct security for the repayment of the amounts deposited.

It has been found that savings banks promote habits of economy among the less wealthy classes, and thus constitute a source of much benefit to society generally. The promotion of systematic saving of small earnings has been still further extended in many European countries by the establishment of post office, military, and naval savings banks. *Postal savings banks* were authorized in England by an act of Parliament in 1861. Depositors are provided with a deposit book. Every deposit is entered in the deposit book by the receiving officer. It is attested by the stamp of his office, and the amount is reported to the Postmaster General the same day it is received. No depositor may place savings exceeding \$150 per year and the minimum receivable at any time is 25 cents. *Military and naval savings banks* are designed to accommodate the frugal soldiers and sailors. Institutions of this character are maintained in several countries of Europe.

The savings banks of the United States are under the direction of private corporations. Depositors are protected by State laws in some instances, though a number of the states have not yet enacted laws of this character. However, there are building and loan associations, a form of coöperative savings banks, in most of the states. These institutions take the place of savings banks in many respects, but money is loaned only to members on improved real estate security. The first savings bank incorporated in the United States was the Boston Provident Savings Institution, in 1816, and the same year was founded the Philadelphia Savings Fund Society, but it was not incorporated until 1819. More than a thousand similar institutions are maintained at present in the United States, all of them resembling the common plan in receiving deposits and paying a rate of interest according to the profit from loaning the deposits. Depositors are provided with a pass book, in which all sums of money deposited by individuals, corporations, or societies are entered, and in it is made an account of the withdrawals.

The laws of some states provide that depositors shall be amply secured, and others have provisions which limit the amounts that may be deposited by any one person. In some cases the laws exempt from liens and executions the deposits made by minors and females. These banks are limited in some states by statutory law as to the character of investments that may be made with the deposits, and the amount that is to be invested in proportion to the receipts of the bank. In most states provisions have been made for the examination of the condition of the banks at regular intervals. Only ten

savings banks were maintained in the United States in 1820, in which \$1,138,576 were deposited by 8,635 persons.

In 1919 there were 90,650,542 depositors in the savings banks of the world and the total deposits amounted to \$18,682,942,510. The latest report shows the following interesting facts regarding the savings banks of the leading countries of the world:

	NUMBER DEPOSITS	TOTAL DEPOSITS.	AVERAGE DEPOSITS.
Australia.....	1,086,018	\$164,161,981	\$151.15
Austria.....	4,946,307	876,941,933	177.29
Belgium.....	2,088,448	141,851,419	67.92
Canada.....	213,638	60,771,128	289.14
Denmark.....	1,203,120	236,170,057	196.29
France.....	11,298,474	847,224,910	75.01
Germany.....	15,432,211	2,273,406,226	147.38
Holland.....	1,330,275	72,738,817	54.83
Hungary.....	1,717,515	432,810,515	251.91
India.....	866,693	34,656,371	39.98
Italy.....	6,740,138	482,263,472	71.55
Japan.....	7,467,452	40,887,186	5.48
New Zealand.....	261,948	38,332,823	146.34
Norway.....	718,823	89,633,481	124.69
Rumania.....	145,507	7,426,031	51.04
Russia.....	4,950,607	445,014,951	89.90
Sweden.....	1,892,586	151,480,442	80.54
Switzerland.....	1,300,000	193,000,000	148.46
United Kingdom.....	11,093,469	966,854,253	87.15
United States.....	10,142,908	5,070,486,247	465.20

SAVONAROLA (sä-vô-nâ-rô'là), **Giro-lamo**, eminent reformer and statesman, born at Ferrara, Italy, Sept. 21, 1452; died May 23, 1498. He descended from a noble family, received early instruction under efficient tutors at home, and in 1474 was sent to Bologna, where he entered the Dominican Order. After studying Greek philosophy and theology, he was sent to Saint Mark's Convent at Florence and began to preach there in 1482. Though spiritually strong, he possessed a harsh and unpleasant voice, which caused his lectures to be poorly attended. Soon after he was sent to the convent at Brescia, where he overcame his former defects and attained such fame as a preacher and theologian that he was recalled to Florence in 1489, where he became prior of Saint Mark's in 1491. His sermons were directed against the vices and luxuries practiced by the wealthy at Florence and he foretold that desolation would be spread in Italy by the invasion of foreign enemies, a prediction verified in 1494 by the entrance into Italy of Charles VIII. of France.

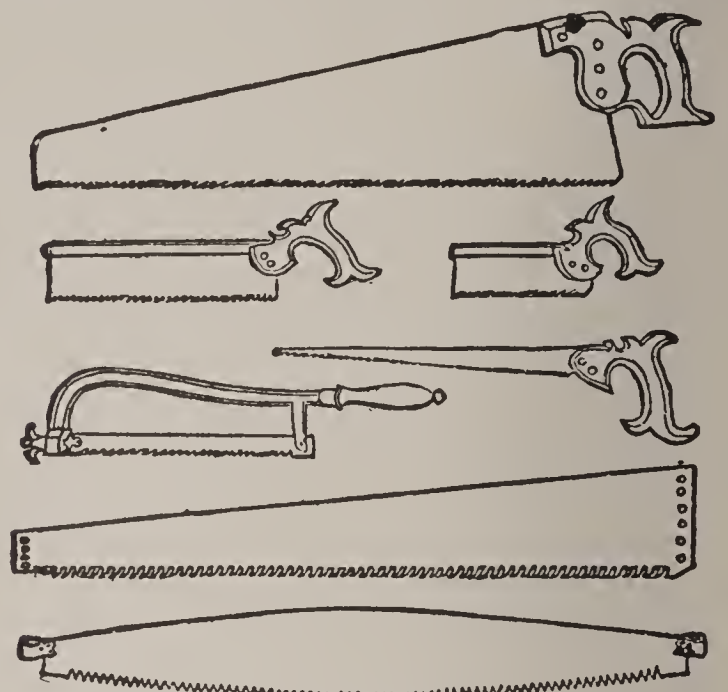
At that time Savonarola was favored by both the government and the church, and his eminent ability induced the Pope to appoint him vicar-general of the Dominican monks in 1493. In that capacity he labored successfully to make the order better and purer. As he was dissatisfied with the aristocratic government of Florence under the Medici family, he welcomed the French under Charles VIII. when invading Italy, and joined a committee to invite him to Florence. The city soon fell under the attacks of the French, and, when the army of France was compelled to withdraw from Italy, Savonarola organized a republic, which was

governed by two councils and a signory. Though he held no office, he was in fact the most potent influence in the new government. Not content with reforming Florence, he began to organize a crusade to revolutionize the Roman court and to place the clergy on a more satisfactory basis. He wrote the Christian princes with the view of securing their assistance, charging that the church was corrupt and suggesting that a general council should be convoked to secure relief from oppressive practices.

While the followers of Savonarola looked upon him as a prophet, the church became arrayed against him, and at length Pope Alexander VI. excommunicated him by issuing a bull. This was read in the Florence cathedral in 1497, and Francesco di Pugli, a Franciscan friar, publicly denounced him. Difficulties began to deepen, both in the church and government, and finally the ordeal of fire was agreed upon to test the truth of the pretensions of Savonarola as to having divine power. A disagreement caused the plan of carrying out the ordeal to fail, and he withdrew to Saint Mark's Convent, where he was arrested by a mob and cast into prison. In the meantime the city government passed to those opposed to Savonarola. Thus deserted by church and state, he was put through a mock trial with torture and condemned to die as a heretic. He and two other Dominicans named Silvestro Maruffi and Domenico Buonvicini, were strangled at Florence on May 23, 1498, and the bodies were burned. Writers generally agree that Savonarola was a man of remarkable genius, and an enthusiastic and devoted reformer. His writings are very numerous, both in the Latin and Italian, the principal works embracing "Simplicity of the Human Soul," "Perfection of the Spiritual Life," "Triumph of the Cross," "Treatise on Humility," "Mysteries of the Mass," "State of Widowhood," and "Love of Jesus Christ."

SAVOY (sà-voi'), **House of**, a distinguished royal house of Europe, which is now represented in Italy by the reigning dynasty. It may be said to be traceable back to the year 407 A. D., when the small territory of Savoy was seized by the Burgundians from the declining power of Rome. Emperor Henry V. bestowed the title of Count of Savoy on Amadeus III. in 1111 and Emperor Sigismund, in 1416, made Amadeus VIII. the first Duke of Savoy. From 1485 the dukes of Savoy claimed to be kings of Cyprus and Jerusalem, but the title of king was not generally recognized until the Treaty of Utrecht was concluded in 1713. That treaty ended the War of the Spanish Succession and gave to Victor Amadeus II. the island of Sicily and a part of the duchy of Milan, and conferred upon him the title of king. He was compelled to surrender Sicily to Austria in 1720, but received in exchange the island of Sardinia, which, along with his other possessions, was erected into the kingdom of Sardinia.

SAW, an instrument with a tempered steel blade and pointed teeth arranged continuously, used to cut wood, stone, metal, or other substances. Many kinds of saws are employed in the arts and industries, their form, size, and shape depending upon the uses for which they are intended. The smallest are those used in surgical and dental operations, from which they



SOME FORMS OF SAWS.

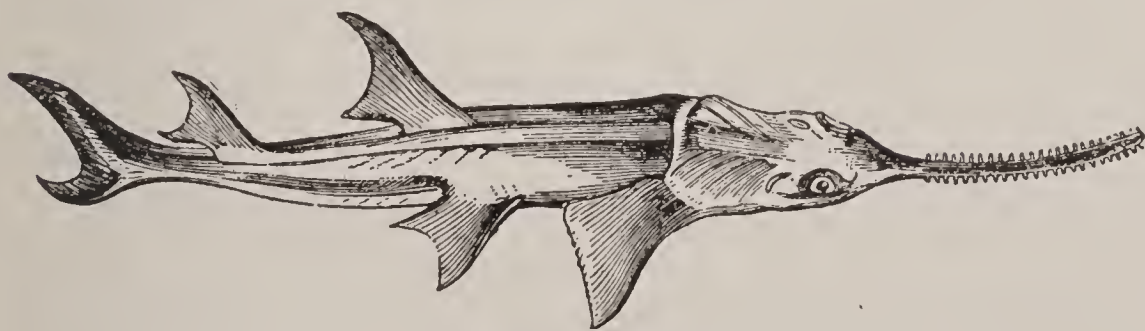
range to the great saws employed in sawmills for cutting the largest timber. The best saws are of tempered steel, ground smooth and bright, and the teeth are either cut, filed, or punched, but in larger ones, especially circular saws, inserted and removable teeth are employed to a considerable extent. To manufacture a first-class saw it is necessary to secure uniform thickness in the blade. It is required to have elasticity sufficient to spring back into shape, if bent into a bow by accident. The teeth are sharpened with a triangular file, the blade of the saw being first fixed in a whetting block. When inclined forward or backward, they are said to rake, and to give better clearance the teeth are alternately inclined laterally, hence they cut a little wider than the blade. This is called the *set*.

The two general classes of saws are known as handsaws and machine saws, and of each there are numerous kinds. *Handsaws* are variously named, according to the uses they serve. The most common forms include the panel saw, meat saw, ripping saw, frame saw, keyhole saw, tenon saw, dovetail saw, and sash saw. All these are for use by one person, and the blade tapers in width from the handle. The *crosscut saw* is intended for two persons, having a handle at each end, but there are forms of the crosscut saw designed for use by one person. A *circular saw* consists of a disc having saw-teeth cut or fixed in its periphery. It is mounted on an arbor, with which it rotates, usually at a high speed. The circular saw is used in sawmills, often one saw above another, and the log is pushed against it by means of

a traveling platform. This saw is likewise employed for cutting across blocks of wood, as cutting cordwood for fire lengths.

Three forms of sawing machines are used in the sawmills, including the circular, band, and straight saws. Where large logs are cut, two circular blades instead of one are used, the advantage being that lumber may be cut with greater rapidity, while timber may be saved in that the *kerf*, or *groove*, can be less wide. Besides, two saws arrayed in this way make it possible to drive them faster and secure a truer cut. A *bandsaw* is one made by placing a thin endless saw like a belt over two wheels, the band passing rapidly and operating on the material moving against it, either by hand or on a platform. Bandsaws are used largely for resawing, and a saw deflector is often used to keep the belt in line. *Straight saws* are of two kinds, the drag saw for cutting a log in two, and the jig saw for light ornamental work. *Circular blades* are used largely in metals; some are toothed, while others are plain, the friction of rapid rotation cutting the metal. Toothless blades are used quite largely in marble and other stone. Many saws have come into use for special purposes, such as are employed for rabbeting and cutting weatherboards and for circular and ornamental work. Sawmills are large establishments for sawing logs into lumber by power, either steam or water power being used. It may be said that sawmills are comparatively modern, the earliest having been built at Augsburg, Germany, in 1322. The first one set up in England was built by the Dutch in 1663, near London, but prejudice against labor-saving machinery caused the populace to destroy it. The sawmills of Canada and the United States constitute a vast industry, millions of feet of lumber being cut for domestic use and exportation.

SAWFISH, a genus of fish bearing resemblance both to the sharks and rays, but distinguished by having a long beak or snout.



COMMON SAWFISH.

They attain a length of from ten to twenty feet and may be counted among the most savage of fish. The beak is often six feet long. It has from 16 to 28 pairs of teeth set horizontally in sockets, and is used to rip or tear open its prey. Sawfish have been known to inflict mortal wounds on whales. Their flesh is too coarse to be eaten. Many species have been enumerated. The common sawfish, native to the

Atlantic from New Brunswick to Florida, is the best known.

SAWFLY, the popular name of a class of insects that deposit their eggs in holes cut into vegetable tissues. They are so named from the sawlike apparatus with which the females are supplied, which they use in conveying the eggs into these openings. The female deposits one egg in each perforation, together with a peculiar fluid, which gives rise to a small swelling or enlargement to accommodate the larva. Most of the species, of which there are about 2,000, are native to the temperate regions. Some species are very injurious to the leaves and fruit of cultivated trees, while others are pests to wheat, barley, grapes, and other plants. The *Cimbex Americana*, the largest species of North America, lays eggs in the leaves of birch, elm, and willow trees. Others attack the rose, currant, and pear trees.

SAWYER, Thomas Jefferson, teacher and clergyman, born in Reading, Vt., Jan. 9, 1804; died July 24, 1899. He graduated from Middlebury College in 1829, and from 1830 to 1845 was a Universalist pastor in New York City. While there he edited the *Christian Messenger*. In the latter year he was appointed principal of the Liberal Institute, at Clinton, N. Y., where he taught classes in theology until 1852, when he resumed pastoral work in New York City, continuing until 1861. From the latter year until 1869 he taught theology at the Liberal Institute, when he was chosen professor at Tufts College, Medford, Mass. Sawyer defended the doctrines of Universalism in various writings and discussions and brought profound scholarship and culture to its support. His writings include "The Endless Punishments," "The Doctrine of Universal Salvation," and "Who is Our God—the Son, or the Father?"

SAXE (säks), **John Godfrey**, poet, born in Highgate, Vt., June 2, 1816; died March 31, 1887. After graduating at Middlebury College in 1839, he studied law at Saint Albans, Vt., where he was admitted to the bar in 1843. He established a successful practice in Franklin County, served as attorney in Chittenden County, and was superintendent of common schools for two years. From 1850 to 1856 he edited the *Burlington Sentinel*, was attorney for Vermont one year, and in 1859 and 1860 was an unsuccessful

candidate on the Democratic ticket for Governor of Vermont. Saxe wrote many poems and was greatly in demand as a lecturer, especially at school and college commencements. The later years of his life were spent in Albany, N. Y., at the home of his son. His principal writings include "Clever Stories of Many Nations," "Proud Miss McBride," "Money King and Other Poems," "Fables and

Legends of Many Countries," "Masquerade," and "Leisure Day Rhymes." He contributed extensively to the *Atlantic Monthly*, *Harper's Magazine*, and *Knickerbocker Magazine*.

SAXE, Maurice, Marshal, eminent soldier, born at Goslar, Germany, Oct. 28, 1696; died Nov. 30, 1750. He was a son of Augustus II., elector of Saxony, and the Countess of Königs-mark. In 1708, when only twelve years old, he was induced by his fondness for military life to leave home and join the army of Marlborough in Flanders, with which he was present in the capture of Lille and the siege of Tournay. He joined the Russian army stationed in Poland in 1711, taking part in the Battle of Riga, but in 1714 returned to his home in Dresden, Germany. After obtaining a pension from his father, he went to Paris in 1720 to study military tactics, and in 1726 became Duke of Courland, from which he was compelled to retire after resisting the allied Russians and Poles for three years. His brother, Augustus III., succeeded his father to the throne of Saxony and offered him command of the Saxon army, but he declined and accepted in its stead a command in the army of France. For distinguished services at Ettingen and Philippsburg he was made Marshal of France, in 1744. He commanded the French army in Flanders with superior tact in 1745, and gained a victory over the English under the Duke of Cumberland at Fontenoy. In 1746 he defeated the allies at Roncoux and the following year was victorious over their forces at Lawfeld, Bergenop-zoom, and Maestricht. The Peace of Aix-la-Chapelle soon followed. It may be said that the decided advantages gained by France are due largely to the military genius of Saxe. Soon after he took up his residence on his estate at Chambord, France, where he died of dropsy.

SAXHORN (säks'hörn), a wind instrument much used in military bands. It was invented at Paris, France, in 1842 by Adolph Sax, a native of Belgium. It has a long, winding tube with a wide, bell-shaped opening, is supplied with from three to five valves, and possesses a large compass with full, rich tone. Several sizes and varieties are in use, thus supplying the necessary instruments to make up a whole band, but the tone is not sympathetic enough for fine orchestral use. Military music has been much influenced by the saxhorn and another instrument by the same inventor called the *saxophone*. The latter has a clarinet mouthpiece and a single reed. Its body is a parabolic cone of brass provided with a set of keys. It is of value in military bands and, like the saxhorn, is easily learned and carried.

SAXIFRAGE (säks'i-frāj), an extensive genus of hardy perennial herbs, with alternate leaves and simple flower stems. They are distinguished by a many-seeded capsule, have leaves six to seven inches long, and the stalks

are one to two feet high. The flowers are yellow, white, or red, and most of the plants grow in rocky places, to which their clustered roots are well adapted. About 160 species have been described, many of them being domesticated for ornamental garden plants, and fully 50 are native to America. Plants of this genus are confined largely to the colder and temperate parts of the Northern Hemisphere. A species known as *beefsteak*, or *strawberry geranium*, is a common house plant.

SAXONS (säks'ünz), one of the races of people that originally inhabited the northern part of Germany, called *Sachsen* in the German. They are first mentioned in history by Ptolemy, in whose time they occupied a large region between the Elbe, Trave, and Eider rivers. By the 3d century of the Christian era their numbers had increased materially and they organized themselves into a confederation, which occupied the northwestern part of Germany. Subsequently they formed an alliance with the Franks. They invaded Roman territory in the times of Emperors Julian and Valentinian, and about the same time made settlements on the coasts of Gaul and Britain. It is probable that the first Saxon settlements were made in Britain as early as 287, but their union with the Angles and Jutes appears to have been formed about 450, and about that time they conquered a large region of that island, giving to the people of England the name of *Anglo-Saxons*. Their principal settlements in England were in Sussex, or South Saxon, and Essex, or East Saxon.

The Saxons remaining in Germany occupied a vast region that became known as *Alt Sachsen*, or Old Saxon, but its limit cannot be easily defined, since frequent wars against invading tribes changed the boundaries at various times. It may be generally defined as including the country inclosed by the North Sea, the Hartz Mountains, the Rhine, and the Elbe. In 531 they fought under an alliance with the Franks against the Thuringian kingdom, which they subdued and destroyed, and in consequence added it to their possessions. In 719 a prolonged war arose between the Saxons and the Franks, which terminated in 804 by Wittikind, the last Saxon king, submitting to the Franks under Charlemagne. At that time they gave up paganism and adopted Christianity as their religion. See **Saxony**.

SAXONY (säks'ün-ī), a state of Germany, lying north of Bohemia and east of Silesia. The length from east to west is about 135 miles; breadth, 75 miles; and area, 5,788 square miles. Practically all of Saxony lies in the Elbe basin, being drained by that river and its tributaries, the Elster, Mulde, and Spree rivers. A small part in the east is drained into the Oder by the Neisse. It is separated from Bohemia by the Erzgebirge and slopes gradually toward the north, most of the surface being fertile and undulating.

PRODUCTS. The country has valuable deposits of granite, iron, silver, tin, nickel, lead, bismuth, cobalt, zinc, arsenic, antimony, and coal. The mines are among the most important of Germany, especially those producing iron and coal. The soil products embrace cereals of all kinds, vegetables, pears, apples, plums, and grapes. Horned cattle, horses, milch cows, swine, sheep, and poultry are produced in abundance. The manufactures include large quantities of cotton and woolen goods, ribbons, silk textiles, pottery, leather, chemicals, and machinery. Saxony is traversed by a large number of railroads, including a total of 2,125 miles, and it has excellent highways and numerous telephone and telegraph lines.

GOVERNMENT. Saxony is divided for governmental purposes into the four districts of Leipsic, Dresden, Bautzen, and Zwickau. It is a constitutional government, under the constitution of Germany. The right of suffrage is vested in both sexes. It has a legislative assembly of two houses, the higher chamber of which is formed of princes of the royal family, nobles, proprietors, and representatives of the universities, while the lower chamber is constituted of deputies from the towns and rural communes. Lutheran is the state religion, but all religious forms are tolerated. The University of Leipsic is the recognized head of its educational affairs. It has an excellent system of public schools, including kindergartens, elementary schools, gymnasia, and *Real-schulen*. The government owns practically all the railroads and telegraph lines, and fosters agricultural and industrial arts by the maintenance of institutions of learning devoted to special lines. All male citizens are required to serve three years in the army, but in addition are classed for four years in the reserve and five in the *Landwehr*. The kingdom has four votes in the federal council of the German Empire and is entitled to 23 deputies in the *Reichstag*. Dresden is the capital. Other important cities are Leipsic, Plauen, Chemnitz, Freiberg, and Zwickau.

HISTORY. The people of Saxony are descendants from the *Sachsen*, or Saxons, and the reigning dynasty descended from Wittikind, the last Saxon king, who was conquered by Charlemagne in 804. At that time they became a part of the German Empire, but the territory now included in Saxony does not correspond to the region then occupied by them, when it was farther toward the north. It was made a dukedom in 880, when Otto became the first duke, reigning until 912. He greatly extended the territory by conquests from the Normans and his son, Duke Henry (912-936), became Emperor of Germany in 919. The duchy passed to the Bavarian branch of the Guelph family in 1127, and Rudolph II. (1356-1370) assumed the title of Elector of Saxony.

John George I. (1611-1656) sided with the Protestants in the Reformation and joined

Gustavus Adolphus, his army taking part in the battles of Bridenfeldt and Lützen. Frederick Augustus I. (1694-1733) embraced Catholicism in 1697 to become King of Poland, since which time the court of Saxony has been Roman Catholic, but the state religion has remained Protestant. Frederick Augustus II. (1733-1763) joined the War of the Austrian Succession against Maria Theresa. During the Seven Years' War the country was ravaged, and it was many years before prosperity was fully restored. Frederick Augustus III. (1763-1827) first fought against France, but his army went over to Napoleon's side after the Battle of Jena, and he received in return the title of king, and large additions of territory.

Saxony became the battle ground between Napoleon and the allies in 1813. Within its confines were fought the decisive battles of Lützen, Dresden, Bautzen, and Leipsic. When the Congress of Vienna, in 1814, adjusted the division of territory, a large part of Saxony was turned over to Prussia. Peace was not disturbed after that until the Revolution of 1848-49, but in the Austro-Prussian War of 1866 Saxony sided with Austria, and was immediately invaded by a Prussian army. After the war Saxony became incorporated with the North German Confederation, since which time it has enjoyed remarkable prosperity in railroad building and manufacturing enterprises. When Napoleon III. declared war against Prussia, in 1870, Saxony rallied to the support of the German states, its present king, Albert, commanding the army of the Meuse. In 1871 it became a part of the German Empire. Population, 1905, 4,508,601; in 1920, 4,802,485.

SAXTON (säks'tūn), **Joseph**, inventor, born in Huntington, Pa., March 22, 1799; died in Washington, D. C., Oct. 26, 1873. After attending the public schools, he became apprenticed to a watchmaker and soon after removed to Philadelphia. There he invented a machine for cutting the teeth of watch wheels, an invention that has revolutionized the art of making watches and clocks. He constructed the clock for the tower of Independence Hall. In 1828 he went to England, where he remained until 1837, and while there constructed a magneto-electric machine and a locomotive differential pulley. After returning to the United States, he became superintendent of the responsible work of constructing the machinery and balances for the United States mint at Philadelphia. His later inventions include an immersed hydrometer, a deep-sea thermometer, and a self-registering time gauge.

SAY, Jean Baptiste Léon, statesman, born in Paris, France, June 6, 1826; died April 21, 1896. He secured a liberal education, made political economy a special study, and after the fall of Napoleon III. supported the republic. In 1871 he became a member of the national assembly, was made minister of finance by M.

Thiers the following year, and in 1875 was again appointed to the portfolio of finance in the administration of M. Buffet. This position he held in the succeeding administrations, and in 1880 became ambassador to London, but returned to Paris a few weeks later in consequence of having been elected president of the senate. He wrote a number of excellent works on history and political economy, and in 1880 was honored by membership in the Academy of Moral and Political Sciences.

SAYCE (sās), **Archibald Henry**, Oriental traveler, born near Bristol, England, Sept. 25, 1846. He studied at Grosvenor College and at Oxford, and became tutor at Queen's College in 1870. In the same year he took orders in the Anglican Church, and six years later became deputy to Max Müller as professor of philology, a position he held until 1890. In the latter year he visited Egypt, where he studied Egyptian inscriptions. Among his writings are "Fresh Light from the Ancient Monuments," "Principles of Comparative Philology," "Ancient Empires of the East," "Assyrian Grammar," "Chaldean Genesis," "Higher Criticism and the Verdict of the Monuments," "Races of the Old Testament," and "History of Babylonia."

SAYRE (sā'ēr), a borough of Pennsylvania, in Bradford County, 58 miles northwest of Scranton. It is on the Susquehanna River and the Lehigh Valley Railroad, and is surrounded by a coal-mining and agricultural region. The chief buildings include the high school, the Packer Hospital, and the public library. Electric lighting and waterworks are among the public utilities. The manufactures include machinery, hardware, clothing, and farming utensils. The region was settled in 1840. Sayre was incorporated in 1891. Population, 1900, 5,243; in 1920, 8,078.

SCAB, a contagious disease common to sheep, but which also attacks horses and cattle. It is due to a minute insect burrowing in the skin, causing baldness and itching. The disease is favored by dirt. Among the remedies are turpentine, mercurial ointments, tobacco water, and solutions of arsenic. The remedies should be carefully applied and repeated a number of times.

SCABBARD FISH (skāb'bērd), a fish of the mackerel family, distinguished by having a continuous spinous dorsal fin. The body is elongated, the teeth are pointed and cutting, and the caudal fin is forked. Several species grow to a length of five or six feet. They swim with much velocity, waving through the water like a long and wide ribbon of silver, displaying beautiful reflections with the change of light.

SCALE, in music, the regular succession of notes arranged in the order of pitch. In its simplest form the scale consists of seven steps or degrees, counted from a root or prime up-

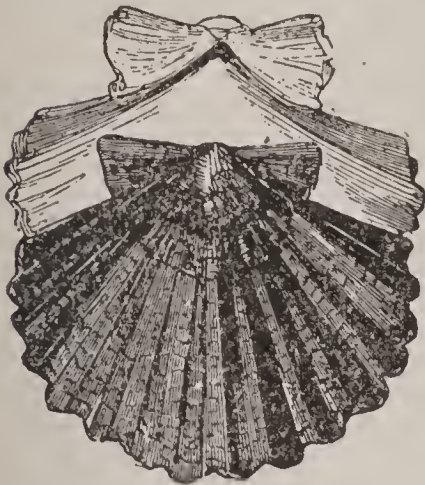
ward in regular order, and to this series is added the eighth to complete the octave. The same notes constitute the descending scale when the motion is reversed. To this may be added other notes, either above or below, in a continuous order to form seven, eight, or more octaves. The tones and semitones of the octaves in their natural order constitute the *diatonic scale*, as *A, B, C, D, E, F, G, A*. In modern music only two varieties of the diatonic scale are in use, namely, the *major* and the *minor*, but other diatonic scales were used in ancient music. However, one semitone greater in the major than in the minor is called the *third diatonic scale*. A scale is major when the interval between the keynote and the third above it consists of two tones, as from *C* to *E*, and it is minor when the interval between it and its third consists of a tone and a half, as from *D* to *F*.

SCALE INSECT, the common name of a class of destructive insects, frequently called *bark louse*, or *scale bug*. They are distinguished in that the female is wingless, that both sexes have legs which terminate in a single claw at the tip of a tarsus, and that the male has two wings. The body is covered with small scales, which in some species are naked and in others are covered with minute hair or minute down. These insects gather in large numbers on plants and injure them by sucking the juices. They are especially harmful to hothouse plants and many fruit-bearing trees. Some of the species produce several broods in a year. Alkaline washes are effectual in checking their ravages, both within and without the greenhouse. In some states and countries it is required that nursery stock must be examined by an official before it can be sold, this precaution being necessary to protect orchards from scale insects. Young trees that contain these pests may be fumigated with hydrocyanic acid.

SCALES, the name applied to protective plates that arise from the skin of various animals, such as fishes and snakes. The purpose of such scales is to protect the body. In lizards and snakes the scales are formed by the cutis, but they are attached to the skin and adhere to it when the latter is shed. Some lizards are almost without scales, while in some animals they are so small that they can hardly be seen without the microscope. Some mammals are scaly, such as the scaly ant-eater and the scale-tailed squirrel. The term *scale* is applied in botany to the bracted leaves which protect the delicate organs of plants, as in the leaf buds of some species during the winter.

SCALLOP (skōl'lūp), the name of several species of shellfish, so called from their round, ribbed shell with scalloped edges. They are classed as bivalves, having shells connected at the upper side with a hinge. The shells are fan-shaped and have numerous green eyes on

the inner fold or mantle. The animal is enabled to swim by means of a little air bag inside, and it is facilitated in movement by opening and shutting its shell. Young scallops are frequently



COMMON SCALLOP.

seen swimming in the water, but the older animals attach themselves to rocks, where they remain stationary like oysters. The term *scalloped oysters* was derived from the circumstance that the shell was used frequently in cooking oysters. Scallops abound in almost all seas, about 200 species being known, many being edible. In the Mediterranean, off the coast of Palestine, scallops are quite abundant and were caught from remote antiquity, their shells being converted into souvenirs for those visiting the Holy Land. A number of species are abundant off the coasts of New England and the Middle States, where they are caught extensively for food.

SCALP, the skin forming the outer covering of the skull. It is quite the same as the skin growing on other parts of the body, differing from it only in having a more prolific growth of hair, and being composed of an expanded muscular tendon in addition to the ordinary skin, through which many blood vessels permeate. The term scalp is generally applied to all the part of the skin of the head which is covered with hair. Formerly the American Indians used the scalping knife to remove a part of the scalp from those killed or taken captive in war. Frequently the victim was alive when the scalp was being removed. Indian warriors who secured the greatest number of scalps were highly honored, and it was a matter of pride to wear a large number as trophies dangling from the belt.

SCAMMONY (skām'mō-nŷ), the name of a twining plant found in various parts of Europe and Asia, especially in Greece and Asia Minor. The root is a tuberous and tapering growth, from three to four feet in length, and contains a milky juice. When a fresh root is cut, the juice exudes and later dries into a slate-colored lump, which constitutes the cathartic drug known as *scammony*. It is a resin and has been used as a medicine from a remote period. Scammony is commonly administered in combination with other purgatives, since it is quite harsh and violent if taken alone.

SCANDERBEG (skān'dēr-bĕg), patriot and prince of Albania, born in Croia about 1404; died at Alessio, Jan. 17, 1468. His proper name was George Castriota, being the son of John Castriota, but Scanderbeg is the name applied to him by the Turks, meaning Alexander Bey.

The Turks took him a captive when seven years old. His physical beauty and intelligence so pleased Sultan Amurath II. that he was brought up in his palace in the Moslem faith. He received instruction in the Turkish, Slav, Arabic, and Italian languages, and upon reaching maturity was put at the head of a Turkish army. In 1433 he greatly distinguished himself as a Turkish pasha. Soon after he learned that his father's estate had been confiscated, when he resolved to return to his native land. He accordingly deserted the Turkish army in 1443, taking with him a number of Albanians, and renounced the faith of the Moslems. All of Albania was soon in arms under his leadership, and with an Albanian army of 15,000 he repeatedly defeated the Ottoman forces. Mohammed II. took the field against him in person, but was obliged to accept terms of peace. It was the ambition of the Pope to secure a powerful Christian alliance to aid Scanderbeg, but failing in this the latter maintained the independence of Albania for 24 years, and in the meantime defeated the Turks in 22 battles. The Turks reduced Albania shortly after his death.

SCANDINAVIA (skān-dī-nā'vī-ā), anciently the name of the region now included in the kingdoms of Sweden, Norway, and Denmark.



SCANDINAVIA.

At present it is variously applied to the language and literature of the people occupying this region and Iceland. The Scandinavian Peninsula is situated in the northwestern part of Europe. It is bounded on the east by Finland, the Gulf of Bothnia, and the Baltic Sea, south by the Skager-Rack and Cattegat, west by the Atlantic, and north by the Arctic. It

is 1,240 miles long, from 225 to 260 miles wide, and has an area of 298,000 square miles. The two kingdoms of Sweden and Norway occupy the whole of the peninsula, and south of it, across the Skager-Rack and Cattegat, is the kingdom of Denmark. A Teutonic people occupied most of the region in the early historic period of Europe. The inhabitants of the territory now included in Denmark and Schleswig were known to the Romans by the name of Cimbri, and the region occupied by them, as the Cimbrian Peninsula. In the 9th century large numbers of Vikings or Northmen moved in their galleys along the coasts of Northern Europe, visiting England, France, Germany, Spain, and Italy. In these movements they plundered cities and the coast regions, but founded new states and materially influenced the industries and the language. Scandinavian literature includes a number of valuable productions, the most notable being the *Sagas* and *Eddas*. See **Iceland**.

SCAPULA (skăp'û-lâ), the shoulder blade, a triangular bone of the upper extremity, forming a part of the shoulder. In form it is flat and irregular, suitable for the attachment of many muscles. In man it is located back of the chest. It is not fully ossified until the age of 25 years.

SCARABAEUS (skâr-â-bē'ûs), an extensive genus of insects, including about 3,000 species. The greater number are native to the tropical regions, but species of the genus are found in nearly all countries. Those found in the warm climates include the largest of beetles and the size decreases with the colder latitudes, those found in Central North America and Europe being comparatively small. The *dung beetles* are well known types of this class of insects. They are useful in warm and temperate countries for their habit of removing offensive matter, which they roll in the form of balls. They often lay their eggs within the balls and bury them below the surface. The *sacred scarabaeus* of Egypt is another familiar kind. It is still the type for the Egyptian scarab, an ornament made in the shape of a beetle of hard stone or gems. This beetle was worshiped by the ancient Egyptians. It was embalmed for centuries. Many of the tombs and monuments of Egypt contain representations, and they are often accompanied by hieroglyphics. Many scarab gems were also engraved by the Greeks and Etruscans.

SCARFOGLIO, Signora. See **Serao**, Matilda.

SCARLATINA (skâr-lâ-tē'nâ), or **Scarlet Fever**, an infectious specific form of fever. It is most prevalent among children, but occurs at any age. Scarlatina consists of an inflammation of the skin and extends along the mucous membrane of the throat. It is attended by a contagious fever and is followed on subsidence of the fever by scaling off of the cuticle. Three

more or less distinct forms are recognized, all requiring careful attention. *Scarlatina simplex* is a mild form of scarlet fever, but sometimes merges into more complicated ailments. *Scarlatina anginosa* is a form with intense fever, extensive ulceration of the throat, and livid rash. *Scarlatina maligna* is a form of the disease in which all the morbid conditions are distinct and usually proves fatal. Headache, shivering, frequent pulse, loss of appetite, and flushed face are among the early symptoms of the disease. Eruptions about the size of a pin-head appear on the skin the second or third day, when the throat is largely affected and the tonsils become swollen. Since it appears as an epidemic, it includes both mild attacks and epidemic forms uniformly severe.

SCARRON (skâ-rôn'), **Paul**, novelist and humorist, born in Paris, France, in 1610; died Oct. 16, 1660. He studied to enter work in the church, but soon gave himself up to a gay and dissolute life. Nervous diseases caused him to become crippled and distorted at an early age. He then applied himself to literature and soon acquired a reputation by his caricatures and humorous sketches. The Queen of France gave him a pension from her private purse and he was aided by the Bishop of Le Mans, which enabled him to make his house the favorite resort of men and women who were fond of literature. In 1652 he married Françoise D'Aubigné, who afterward became the mistress of Louis XIV. as Madame de Maintenon. He is the author of numerous comedies and burlesques. His writings were translated under the title "The Comical Works of Scarron."

SCHADOW (shä'dô), **Johan Gottfried**, sculptor, born in Berlin, Germany, May 20, 1764; died Jan. 28, 1850. He studied drawing and sculpture in his native city and at Rome, and in 1788 became professor at the Berlin Academy of Art. Much of his time was spent in traveling in Southern Europe, but he continued to live at Berlin, where he executed many celebrated works of art. Few modern sculptors have exceeded him in the number of important works, especially in making large figures, and he is surpassed by none in producing representations of individual truths and historical exactness. Among his statues are those of Luther at Wittenburg, Blücher at Rostock, and Frederick the Great at Stettin. His monuments include "Frederick the Great with His Greyhounds," "Hercules Slaying the Centaur," "Quadriga of Victory," "Crown Princess Louisa and her Sister," and "Girl Reposing."

SCHAFF (shäf), **Philip**, American clergyman, born in Coire, Switzerland, Jan. 1, 1819; died Oct. 20, 1893. After studying at the German universities of Tübingen and Halle, he took an extended course in Berlin, where he began to lecture on theology in 1842. The next year he was recommended to fill a professor-

ship of church history in the Theological Seminary at Mercersburg, Pa., an institution belonging to the German Reformed Church. He entered upon this work with marked success in 1844, was sent to represent his church at the ecclesiastical diet at Frankfort, Germany, in 1854, and in 1862 became lecturer of Andover Seminary. After serving in that capacity until 1870, he was made professor in the Union Theological Seminary, New York City, where he lectured with remarkable energy until 1893. Schaff served as president of the American committee on Bible revision in 1871, visited Palestine in 1877, and was the first president of the American Society of Church History, an organization formed in New York in 1888. His last public discourse was delivered in 1893 before the parliament of religions in Chicago. Among his writings are "History of the Christian Church," "Creeds of Christendom," "History of the Apostolic Church," and "The Person of Christ." A number of his writings have been translated into French, Greek, Italian, Bulgarian, Chinese, Japanese, Hindustani, and Arabic.

SCHAFFHAUSEN (shäf-hou'zen), a city of Switzerland, capital of the canton of Schaffhausen, 25 miles north of Zurich. It is finely situated on the Rhine, has electric and steam railway facilities, and is the center of a large trade in produce and merchandise. The chief buildings include the townhall, the museum and library, the theater, and several fine schools and churches. Two bridges cross the Rhine and connect it with Feuerthalen, on the opposite side of the river. It has manufactures of watches, textiles, machinery, pottery, and scientific instruments. Schaffhausen was long a free city, but joined the Swiss Confederation in 1501. The early growth is due to the famous falls of the Rhine, which descends nearly 100 feet in passing over three ledges. Most of the people are Protestants. Population, 1920, 18,196.

SCHAUFFLER (shouf'lër), **William Gottlieb**, eminent missionary, born in Stuttgart, Germany, Aug. 22, 1798; died in New York City, Jan. 26, 1883. After studying for some years in Germany, he conducted missionary work in Turkey, and came to the United States in 1827. Later he entered Andover Seminary to take a course in theology and soon after again entered the missionary work, making it a specialty to labor among the Jewish people. His principal field of activity was in Constantinople, where he spent forty years among the Jews and Armenians. While there he translated portions of the Bible into the Turkish and Hebrew-Spanish languages. Few missionaries have been as successful in learning languages and none have wielded a wider personal influence than he. His writings show that he mastered fully twenty tongues sufficiently to read them with accuracy and he spoke ten of them fluently. Among his chief writings are "The Trumpeter of

Sackingen," "Essays on the Right Use of Property," "Meditations on the Last Days of Christ," and "Songs of the Time of Heinrich von Osterdingen."

SCHECHTER (shëk'tër), **Solomon**, eminent scholar, born in Fokshani, Rumania, in 1847. He studied at universities in Vienna and Berlin, and in 1892 was made professor at Cambridge University, England. In 1894 he lectured at Gratz College, Philadelphia, and about the same time visited many places of interest in the United States. He went to Cairo, Egypt, to study Jewish literature, and while there discovered parts of the Jewish original of *Ecclesiasticus*. On returning to England, he was awarded a degree by Cambridge University and subsequently was professor of Hebrew College, London. In 1904 he was made president of the Jewish Theological Seminary in New York City, beginning active service the following year. His publications include works entitled "Studies in Judaism," "Wisdom of Ben-Sira," "Abot de Rabbi Nathan," and "Saadyana."

SCHEELE (shä'le), **Carl Wilhelm**, eminent chemist, born in Stralsund, Germany, Dec. 19, 1742; died May 21, 1786. He was apprenticed to an apothecary in Gothenburg, Sweden, where he secured his early knowledge of chemistry, and in 1767 located as an apothecary in Stockholm. In 1770 he removed to Upsala, where he carried on extensive investigations in chemistry. At that time he announced discoveries that placed him in the front rank of original investigators. His chief discoveries were tartaric acid, in 1770; chlorine and baryta, in 1774; oxygen, in 1777; and glycerin, in 1784. Oxygen had already been discovered and made known by Priestley, but Scheele was not aware of that fact at the time he announced its properties. He discovered arsenite of copper while experimenting on arsenic and its acid, which is generally known under the name of *Scheele's green*. He was an associate of the Academy of Stockholm, through which he communicated his discoveries from time to time. His principal writings include "Chemical Treatise on Air and Fire" and "Coloring Matter in Prussian Blue."

SCHEFFER (shëf'fër), **Ary**, eminent painter, born in Dordrecht, Holland, Feb. 12, 1795; died near Paris, France, June 15, 1858. He studied drawing in his native town, but later took a complete course in Paris, where he produced his first work in 1812. His paintings were influenced largely by Goethe, Byron, and Dante, from whose writings he selected many of his early subjects. These he beautified by a subtlety and grace of imagination that made them highly popular, and many of them have been engraved in a number of European countries. His most noted paintings include "Faust in his Study," "Margaret at the Well," "Dante and Beatrice in Heaven," "Sulioté Women," and "Christ on the Cross." Among his leading

portraits are those of Lamartine, Lafayette, Talleyrand, Madame Guizot, Liszt, and Béranger. His later works consist principally of views from the Bible, including "The Temptation of Christ," "Christ, the Consoler," and "Christ, the Remunerator."

SCHELDT (skēlt), a river of Europe, one of the most important of Belgium and the Netherlands. It rises in the French department of Aisne, flows north through Belgium, and enters the North Sea by two arms, known as the Eastern and Western Scheldt. The entire course is 260 miles, of which about 210 miles are navigable. Among the flourishing cities on its banks are Ghent and Antwerp. Numerous canals connect it with other river systems, forming a very important commercial highway. The lower course was entirely monopolized by Holland in 17th and 18th centuries, other nations using it being compelled to pay toll for the passage of vessels. When Holland and Belgium separated, in 1831, these rights passed to the latter country, but in 1863 other powers were given the right to use the river for commercial navigation in consideration of the payment of \$3,750,000.

SCHELLING (shēl'ling), **Frederick William Joseph**, eminent philosopher, born in Leonberg, Germany, Jan. 27, 1775; died Aug. 20, 1854. His father was a pastor of Leonberg, near Stuttgart. He first studied philosophy and theology at Tübingen. Later he pursued a course in mathematics and science at Leipsic and subsequently at Jena, where he became professor of philosophy in 1798. In that position he succeeded Fichte, who had guided his philosophical studies as a teacher. About that time he published "On the Real and Ideal in Nature." He became professor at Würzburg in 1803, and in 1808 was called to Munich as secretary to the Academy of Arts. There he remained 33 years, 14 of which he occupied the chair of philosophy in the University of Munich, but in 1841 was called to Berlin by Frederick William IV., where he resided most of the succeeding years of his life. His death occurred while at the Bass of Ragaz, Switzerland.

The philosophical speculations of Schelling were influenced largely by Fichte and Hegel, and in the early period partook quite largely of a pantheistic nature. Later his philosophy became more closely associated with that of Spinoza and Brehme, but it may be said to represent a distinct line. His later speculations were based principally on mythology and revelation, which he called *positive philosophy* to distinguish it from his speculation on identity, called by him *negative philosophy*. His writings are very numerous and scholarly, and are confined almost exclusively to philosophical research and speculation. Among the most important are "System of Transcendental Idealism," "Soul of the World," "Introduction to the Philosophy of Mythology," "Inquiry into

the Nature of Human Freedom," "Philosophy of Revelation," "Philosophy of Nature," and "Exposition of My System of Philosophy." He edited, in conjunction with Hegel, the *Critical Journal of Philosophy*, and published a valuable work entitled "Exposition of the True Relation of the Philosophy of Nature to the Amended Theory of Fichte."

SCHENCK (skēnk), **Robert Cumming**, soldier, born in Franklin, Ohio, Oct. 4, 1809; died in Washington, D. C., March 23, 1890. His ancestor, Roelof Martense Schenck, came from Holland to New Amsterdam in 1650. After graduating from Miami University, he studied law and entered upon a successful practice at Dayton, Ohio. He was a member of Congress from 1843 to 1851, became United States minister to Brazil in the latter year, and in 1861 entered the United States army as brigadier general of volunteers. In 1861 he commanded at the First Battle of Bull Run. The following year he took part in the Battle of Cross Keys and the Second Battle of Bull Run, receiving a gunshot in the latter that shattered his right arm. He resigned from the army in 1863 and in the same year was re-elected to Congress, where he served until 1869. In 1871 he became United States minister to England, but resigned in 1876 to resume the practice of law at Washington, D. C.

SCHENECTADY (skē-nēk'tā-dy), a city in New York, county seat of Schenectady County, on the Mohawk River, sixteen miles northwest of Albany. It is on the Erie Canal and the Delaware and Hudson and the New York Central railroads. The site rises gradually from the Mohawk River. The noteworthy buildings include the county courthouse, the public library, the city hall, the Ellis Hospital, the high school, the Y. M. C. A. and the Van Curler Opera House. It is the seat of Union College, which was founded in 1795. Among its manufactures are cotton and woolen goods, flour, machinery, farming implements, cigars, varnish, carriages and wagons, iron bridges, and locomotives. The public utilities include waterworks, sanitary sewerage, and electric street railways. It has a large trade in produce and merchandise. The first settlement on its site was made by Dutch traders in 1662 and a charter was issued in 1684. It was burned by the French and Indians in 1690. In 1798 it was incorporated as a city. Population, 1905, 58,369; in 1920, 88,723.

SCHILLER (shīl'lēr), **Johann Christoph Friedrich von**, eminent poet, born at Marbach, Germany, Nov. 10, 1759; died May 9, 1805. He was the son of Kaspar Schiller, an overseer of the nurseries of the Duke of Württemberg. After receiving instruction under private tutors he was taught in a school at Lorch, and in 1773 entered the academy founded by the Duke of Württemberg at his castle, known as The Solitude. There he studied law and medicine, but became greatly interested in literature, especially

poetry. His first poem was written in 1772 while still attending the school at Lorch, and ever after poetry remained his chief delight, his principal



FRIEDRICH VON SCHILLER.

interest being in epic and dramatic idealism. He completed the first sketch of "The Robbers" in 1778, which was published in 1780, and two years later was produced on the stage at Mannheim, where it was received with remarkable enthusiasm. Schiller was present at the time

without the knowledge of his superiors, which caused his arrest, and finally he left the service of the duke and went to Franconia, where he wrote a number of productions under an assumed name, that of Bauerbach. The writings produced at that time include "Kabale and Liebe." Shortly after he outlined "Don Carlos."

In 1783 Schiller became connected with the theater at Mannheim as dramatist, but two years later proceeded to Leipsic, where he formed an acquaintance with Huber and Kröner. At that time he wrote his "Lied an die Freude" and made a systematic study of Philip II. His "Don Carlos" was published at Dresden, in 1787, and was followed by his "History of the Revolt of the Netherlands." In the same year he visited Weimar, where he met Herder, Wieland, and Goethe, and through the influence of the last named writer secured a professorship of philosophy at Jena. The Duke of Saxe-Weimar granted him a pension, by which he was enabled to provide himself with necessary books of reference, and in 1790 he married Charlotte von Lengefeld. In 1793 he completed his "History of the Thirty Years' War," and once more turned his attention to the production of poems and ballads of the most excellent quality. He lived at Weimar after 1798, where his friendship with Goethe became proverbial, and devoted the remaining years of his life with persevering industry to literary labor.

The most noted dramas of Schiller include "Wallenstein," "William Tell," "Mary Stuart," "The Bride of Messina," and the "Maid of Orleans." Other works of importance not named above embrace "Historical Memoirs from the 12th Century to the Most Recent Times," "Friesco," "Song of the Bell," "Gods of Greece," "Ghost-Seer," "Letters on Esthetic Culture," and "Ideals and Life." Schiller was the recipient of many distinguished honors and was raised to the rank of nobility in 1802. He is by common consent classed among the greatest poetical geniuses of the world, being a tire-

less student and an interesting, earnest, and thoughtful writer. Few authors have been as prolific in producing and none has exceeded him in adding gems of great value to the collective writings of the world. His death resulted largely from overwork, since he continued industriously at his favorite task of writing until the last. He had two sons and two daughters. His widow died in 1826.

SCHILLING, Johann, sculptor, born in Mittweida, Germany, June 23, 1828. He studied at Dresden and Berlin and in 1851 exhibited his first notable work, entitled "Amor and Psyche." The exhibit of this excellent production of art procured him a two years' scholarship at Rome, but in 1856 he settled at Dresden, where he became professor in the academy in 1868. Among the most notable of his productions are the statue of Schiller, at Vienna; the monument of Luther, at Worms; the "War Monument," at Hamburg; and the "National Monument," on the Niederwald. The last named was unveiled in 1883 by Emperor William I.

SCHLEGEL (shlá'gəl), **August Wilhelm**, eminent critic and poet, born in Hanover, Germany, Sept. 8, 1767; died May 12, 1845. After taking a course in secondary schools, he studied classics and philology at Göttingen, and soon attracted attention as a writer and critic by contributing to various magazines. Later he became lecturer on literature and fine arts at the University of Jena. He was elected to a similar professorship at Berlin in 1802, at Vienna in 1808, and at Bonn



AUGUST W. SCHLEGEL.

in 1818. While at the last named institution he devoted himself largely to the study of Oriental history, made numerous translations from writers of foreign countries into the German language, and lectured on philology and the history of fine arts. He may be classed among the first students of Sanskrit in Germany, and while at Bonn established a Sanskrit printing office and an Indian library. His translations into the German include large parts of the work of Dante, Shakespeare, Cervantes, Camoëns, and Calderon. He translated the epic poems of the Sanskrit known as "Rámáyana" and "Mahábhárata," both into the German and Latin. The translation of Shakespeare made by him is still the most classical in the German language. He contributed for several years to Schiller's *Horen* and in connection with his brother published *The Athenäum*. Among his other works are "Characters and Critics,"

"Spanish Theaters," "Wreaths of Italian, Spanish, and Portuguese Poetry," and "Poetical Works." He was raised to the noble rank in 1818.

SCHLEGEL, Friedrich von, historian and critic, born in Hanover, Germany, March 10, 1772; died in Dresden, Jan. 11, 1829. He was a brother of August Wilhelm Schlegel, studied philology at Göttingen and Leipsic, and entered upon a noted literary career. His first writings were in the form of contributions to journals and periodicals, and in connection with his brother he edited *The Athenäum*, a magazine devoted to literary criticism. In 1808 he became councilor of the legation for Austria in the Frankfort diet, serving in that position until 1829, and in the meantime wrote the famous proclamations made by Austria against Napoleon. His writings include "Greeks and Romans," "History of the Old and New Literature," "Philosophy of Life," "Philosophy of Language," "Collection of Mediaeval Romantic Poems," "Language and Education of the Hindus," and "Lectures on Modern History." His wife was the daughter of Moses Mendelssohn and assisted him in a number of his writings.

SCHLEICHER (shlī'kēr), **August**, philologist, born at Meiningen, Germany, Feb. 19, 1821; died Dec. 6, 1868. After attending the gymnasium of Coburg, he studied at the universities of Leipsic, Tübingen, and Bonn, and in 1850 became professor of comparative philology in Prague. He lectured there until 1857, when he was made professor of languages in the University of Jena. His writings cover a wide range of philological subjects, both in relation to ancient and modern languages, and many of them have been widely translated. Some writers have classed him next to Franz Bopp (1791-1867) as an authority on philology. Among the best known works are "Languages of Europe," "History of Languages," "Hand Book of the Latin Language," "Slavonian Languages as Used in Religious Worship," and "Comparative Grammar of the Indo-European Tongues."

SCHLEIERMACHER (shlī'ēr-mä-kēr), **Friedrich Ernst Daniel**, eminent theologian, born in Breslau, Germany, Nov. 21, 1768; died Feb. 12, 1834. He first studied in the schools of the Moravian brotherhood at Niesky, where he received marked religious impressions, and in 1787 entered the University of Halle. In 1794 he became a clergyman at Landsberg, but two years later settled at Berlin, where he assisted Friedrich Schlegel in editing *The Athenäum*. His first noted work to be published was his "Discourses on Religion," which publication marks an era in that it directed attention to the excessive formalities in religious practice. He became professor of theology and philology at Halle in 1804, but when that university was closed on account of the invasion of the French

under Napoleon, in 1806, he returned to Berlin as pastor of the Trinity Church.

He was an important factor in placing the University of Berlin on a stable basis, and in 1810 became a professor in that institution, where he lectured on theology and philosophy. In 1817 he acted as president of the Berlin Synod, and devoted the later part of his life to the completion of a number of extensive works on theology. Among the honors extended to him is an election to the Berlin Academy of Sciences in 1811. His writings include "Christmas Festival," "Concerning the So-called First Epistle of Paul to Timothy," "Christian Faith According to the Fundamental Propositions of the Evangelical Church," "Life of Christ," and "Sermons." Schleiermacher was a man of massive understanding and eloquent oratorical power, and is classed by many writers as taking rank next to Luther as a theologian. His views on theology and philosophy have been commented on by such eminent men as Lücke, Neander, Ullman, Strauss, and Bleek.

SCHLESWIG-HOLSTEIN (shlâz'vīg hōl'stīn), a province of Prussia, in the most northerly part of the German Empire, except the district about Memel. It is bounded on the north by Denmark, east by the Baltic Sea, Lübeck, and Mecklenburg-Schwerin, south by Hamburg and Hanover, and west by the North Sea. It forms a part of the same peninsula with Jutland. The area is 7,340 square miles.

DESCRIPTION AND INDUSTRIES. The surface is level or gently undulating, and the eastern part is indented by deep and narrow fiords. Much of the interior is moorland, while the western part is marshy and requires dikes to protect it from the sea. It is separated from Hanover by the Elbe, while much of the interior is drained by the Eider. A ridge extends along the eastern coast, hence the drainage is almost entirely into the North Sea. The Kaiser Wilhelm Canal, which connects the Baltic with the North Sea, extends through this province. Agriculture is the principal occupation. The leading products include wheat, barley, oats, sugar beets, rye, live stock, and fruits. Iron and turf are the leading minerals. Large quantities of fish and oysters are taken off the shore. Extensive interests are vested in shipyards, machine shops, textile mills, and sugar refineries. Cattle, horses, and swine are reared in large numbers.

INHABITANTS. The inhabitants are almost exclusively Germanic in descent, but the Frisian, Danish, and Plattdeutsch are spoken in some localities. The public schools and the government use the German language. Almost the entire population is Protestant. In 1900 the province had 1,387,968 inhabitants, of whom 135,000 were Danes. Population, 1920, 1,619,673.

HISTORY. Schleswig constituted a so-called *mark* in the kingdom of Germany in the 10th century. It was ceded to Denmark in 1027,

when it was conquered by King Canute from Emperor Conrad II. Denmark raised it to the dignity of an hereditary duchy in the 13th century, and in 1375 it passed to the counts of Holstein. When the Holstein dynasty became extinct, in 1460, Schleswig and Holstein were united in choosing Christian I. of Denmark as the ruler, but with the understanding that they should not be separated from each other nor made a part of Denmark. While Holstein was German and Schleswig was Danish, the nobility and the people became Germanized at an early period.

Christian VIII., who became King of Denmark in 1839, pursued a policy of bringing Schleswig-Holstein more firmly into a union with Denmark. In 1848 he was succeeded by Frederick VII., who proclaimed the annexation of Schleswig. This caused a revolution in Schleswig-Holstein, which was occupied by troops from Germany and the Danes were expelled. In 1850 the protection of Germany was withdrawn and a war began the following year, which resulted in a return to the Danish authority. However, Frederick VII. died in 1863 without heirs and was succeeded by Christian of Augustenburg, under whom the constitution of Denmark and Schleswig was ratified.

It was a part of the policy of Bismarck, when promoting the unification of Germany, to incorporate Schleswig-Holstein with the German Empire. In this movement Prussia was aided by Austria and the two powers sent a force to occupy Schleswig. The Danes were defeated by superior numbers and Christian IX. was compelled to accept the Treaty of Vienna, in 1864, which ceded Holstein, Lauenburg, and Schleswig to Austria and Prussia. The two powers agreed by annexing Holstein to Austria and making Schleswig and Lauenburg a part of Prussia. This agreement finally caused the Seven Weeks' War, in 1866, in which Austria was defeated and Holstein became an integral part of Prussia.

SCHLEY (slī), **Winfield Scott**, naval officer, born in Frederick County, Maryland, Oct. 9, 1839. After attending the public schools, he



WINFIELD SCOTT SCHLEY.

took a course of instruction in the United States Naval Academy, and subsequent to graduation entered the Civil War as master on the Potomac. His service brought him in connection with many important events, including the west gulf blockading and the capture of Port Hudson. Shortly after the close of the war he was assigned to the Pacific squad-

ron, and from 1866 to 1869 he was instructor at the United States Naval Academy. In 1884 he commanded the Greely relief ships *Bear*, *Thetis*, and *Alert*, which brought Greely and six others back from Grinnell Land. He was made captain in 1888 and commodore in 1898, and in the latter year took command of the flying squadron at Hampton Roads, which brought him in prominent connection with the blockade of Santiago de Cuba and the destruction of Cervera's fleet on July 3, 1898. Though the American fleet was under the command of William T. Sampson, the signal victory of the Americans is to be attributed largely to Schley, since he commanded in that engagement on account of the absence of the former. For these eminent services he was made rear admiral. He served as a member of the commission to arrange for the evacuation of Porto Rico by the Spaniards in 1898. Subsequently a controversy arose as to the respective merits of the commanders in the Santiago campaign, known as the Schley-Sampson controversy.

This controversy reached its height when Edgar S. Maclay published the "History of the United States Navy," in which he charged Schley with disobedience and cowardice. The Navy Department, at the request of the latter, appointed Admiral Dewey and Rear Admirals Ramsay and Benham to serve as a court of investigation, with Capt. Samuel C. Lemley as judge advocate. The court made a decision on Dec. 12, 1901, but the verdict was not unanimous. Rear Admirals Ramsay and Benham censured Rear Admiral Schley for his conduct in the Santiago campaign, but exonerated him from cowardice, while Admiral Dewey made a minority report in which he gave him the honor of the victory. His report concludes in these words: "He (Schley) was in absolute command and is entitled to the credit due to such commanding officer for the glorious victory which resulted in the total destruction of the Spanish ships." He died Oct. 2, 1911.

SCHLIEMANN (shlē'män), **Heinrich**, eminent archeologist, born at Neu Buckow, Germany, Jan. 6, 1822; died in Naples, Italy, Dec. 27, 1890. He was the son of a Lutheran pastor, who instructed him from his childhood, and at an early age apprenticed him to a tradesman. This brought him in connection with businessmen of different countries, and he mastered many modern languages of Europe as well as Greek and Latin. He visited Dutch Guiana in 1842. After returning to Europe, he entered a mercantile house at Amsterdam, but subsequently established himself in business at Saint Petersburg, where he gained considerable wealth. In 1862 he came to Sacramento, Cal., and engaged in the banking business until 1866. He went to Asia Minor in 1869 to make excavations on the site of ancient Troy and other notable cities, and in 1874 published "Troy and Its Remains." The Ottoman government required him to pay \$10,000 for the treasures he discovered, which are

now in the Ethnological Museum at Berlin. He obtained permission from the government of Greece, in 1876, to excavate on the site of Mycenae, which led to the discovery of several royal tombs and rich treasures of gold and silver, now deposited in the Polytechnic at Athens. The interesting results of these explorations were published in his work entitled "Researches and Discoveries at Mycenae." Subsequently he made similar explorations on the island of Ithaca and elsewhere, and published his last two works, entitled "Troja" and "Tiryns."

SCHMALKALDEN (shmäl'käl-dēn), a town of Germany, in the Prussian province of Hesse-Nassau, 30 miles southwest of Erfurt. It has a considerable local trade, various manufactures, and a population of 7,688. It is a center of interest on account of the League of Schmalkalden, which was drawn up here on April 4, 1531, by nine Protestant princes and eleven imperial cities, to resist aggressive opposition measures promoted by Emperor Charles V. and the Catholic states. Soon after other princes and cities joined the league, and in the time of its greatest strength it included all the Protestant states lying between northern Italy and Skager Rack. It was first intended to continue the league for six years, but in 1535 an extension for ten years was made, at which time a permanent army was raised to defend the religious and political freedom of the Protestants. A Catholic federation was formed in 1538 in opposition to the Protestant league, but the latter was joined by Francis I., King of France, and Henry VIII. of England declared himself its protector, thus giving the Protestants such strength that Emperor Charles V. found himself unable to contend against it. Mutual jealousy crippled the league. When a battle was ventured at Mühlberg on April 24, 1547, the Protestants were defeated and John Frederick and several other leaders were taken prisoners. However, the objects of the league were accomplished through the diplomacy of Duke Maurice, who, as Elector of Saxony, declared war against the emperor and compelled him to grant the Treaty of Passau, on July 31, 1552, by which the Protestants secured religious liberty.

SCHMIDT (shmīt), **Maximilian**, novelist and humorist, born in Eschlkamm, Germany, Feb. 25, 1832. He served in the army of Bavaria during the War of 1850 and during the Franco-German War, and retired in 1872. With the view of devoting his attention entirely to literature, he settled at Munich. A number of his novels have been dramatized and are well known as popular plays. His writings include "Folklore of the Bavarian Forest," "Musician of Tegern Sea," and "My Wanderings of Seventy Years." His writings were published in an edition of 34 volumes in 1893, entitled "Schmidt's Collected Work."

SCHNITZER (shīts'ēr), **Eduard**. See **Emin Pasha**.

SCHNORR VON CAROLSFELD (shnōr fōn kä'rōls-fēlt), **Julius**, painter, born at Leipzig, Germany, March 26, 1794; died May 24, 1872. He studied painting under his father, Johann Veit Schnorr (1764-1841), and later in Vienna and Rome. In 1827 he was made professor at the Academy at Munich, where he decorated several noted buildings with frescoes from the *Nibelungenlied* and encaustic paintings of subjects in the history of Charlemagne and Frederick Barbarossa. He was made director of the picture gallery at Dresden in 1846, and for some time served as professor of art in the academy in that city. His principal productions include "Alms of Saint Roche," "Luther at the Diet of Worms," "The Bible in Pictures," and "The Family of John the Baptist Visiting the Family of Christ."

SCHOFIELD (skō'fēld), **John McAllister**, soldier, born in Chautauqua County, New York, Sept. 29, 1831; died March 4, 1906. After graduating from the West Point Military Academy, in 1853, he became assistant professor of natural philosophy there, serving from 1855 to 1860. He volunteered his services at the beginning of the Civil War and was made major of the first Missouri volunteers. He commanded under Gen. Nathaniel Lyon in the Battle of Wilson's Creek, in which the latter was killed, and in November, 1861, he was made brigadier general, commanding the Missouri militia and the army of the frontier. In 1864 he was given command of the army of the Ohio and accompanied Sherman on his southern campaign, taking part in the capture of Atlanta. Soon after he defeated Hood at Franklin, Tenn., took part in the Battle of Nashville, and in 1865 was sent with his corps to North Carolina, capturing Wilmington and Kingston, and in March joined Sherman at Goldsboro. He drew up the articles for the surrender of General Johnston and from 1866 to 1868 had command of the Virginia military district. In 1868 he succeeded Edwin M. Stanton as Secretary of War, but resigned the following year to become major general of the United States army. He was superintendent of the military academy at West Point from 1876 to 1881, and in 1888 succeeded General Sheridan as general in chief of the United States army with headquarters at Washington. President Cleveland appointed him lieutenant general in February, 1895, but he was retired the following September.

SCHOLASTICISM (skō-lās'tī-sīz'm), the name of a movement that began with the opening of cloister schools by Charlemagne for the education of the clergy. It was both philosophical and theological in its character and, although confined to no one school, it was distinguished by its teaching of classical logic and philosophy as applied to theology. The philosophers identified with it were known as *scholastics*, or *schoolmen*. The exact time of its origin cannot be clearly stated, and there is a vast difference in

the scholastic philosophy of different periods, but the time of medieval scholasticism is generally assigned to the period beginning with 1000 and ending with 1500. It may be said that the scholastics aimed to reduce church doctrines to a scientific system. Their basic assumption was that the church creed is absolutely true, and, when they found a discrepancy between ancient philosophy and ecclesiastical discipline, they accommodated the former to the latter.

Scholasticism had two chief epochs. The first began with John Scotus Erigena in the 9th century and extended to the beginning of the 13th century, in which the Aristotelian logic and Neo-Platonic philosophemes were accommodated to the doctrines of the church. Among the representative names of this epoch are those of Berengarius of Tours, Pope Sylvester II., Anselm, Archbishop of Canterbury, and John of Salisbury. It was a period of contention between the Nominalists and Realists, which terminated in the triumph of the latter, and it therefore became the prevailing mode of thought in philosophy during the golden age of scholasticism, in the 12th and 13th centuries. The second epoch extends from the 13th to the 15th century, ending with the Renaissance and the Reformation. It witnessed the adaptation of the whole Aristotelian philosophy to theology.

Alexander of Haler (died 1245) was perhaps the first scholastic who was acquainted with all the works of Aristotle and the Arabian commentaries on the same, but after his time many others of wide study succeeded in molding thought from the standpoint of a larger view. In this period rose the Scotists and the Thomists, the former being represented by the Franciscans and the latter by the Dominicans, and the quarrels that resulted greatly curbed the influence of scholasticism. It finally laid down the remarkable proposition that a thing might be philosophically true and theologically false, and *vice versa*. With the revival of letters and the Reformation study began to turn away from the formalities of old philosophies and dead languages as a primary object of investigation, and instead directed its energy to the sciences and human nature. Teachers began to study and observe pupils, to investigate the laws governing physical and spiritual growth, and to proceed according to the newer and better methods.

SCHÖNEBERG (shě'ne-běrk), a city of Germany, situated immediately south of Berlin, of which it is a suburb. It has electric and steam railway communication with the capital. The noteworthy buildings include the public library, the observatory, an insane asylum, and the buildings of the aerial navigation bureau of the imperial army. It has manufactures of paper, clothing, military supplies, scientific instruments, and photographic apparatus. Schöneberg is noted as a residential center and for its fine gardens and boulevards. Population, 1905, 141,010; in 1920, 172,902.

SCHOOLCRAFT (skōol'krāft), **Henry Rowe**, traveler and author, born in Albany County, New York, March 28, 1793; died Dec. 10, 1864. He studied at Union and Middleburg colleges, and passed many years as Indian agent for the government in the region of the Great Lakes. In 1823 he married the granddaughter of an Ojibway chief, a lady who had been educated in Europe, and made his headquarters at Mackinaw. His connection with the Indians enabled him to learn the languages of a number of different tribes and to study their ethnology and antiquities. He served as a member of the Territorial Legislature of Michigan from 1828 to 1832, within which period he founded the Historical Society of Michigan. He commanded an expedition to the region of the Upper Mississippi in 1832, when he discovered and explored its source.

In 1832 the government authorized Schoolcraft to negotiate a treaty with the Indians, which resulted in the purchase of 16,000,000 acres of land in the vicinity of northern Minnesota. He was appointed soon after to act as superintendent of Indian affairs in the Department of the North. Congress authorized him to gather material for an authentic treatise regarding North American Indians, appropriating a large sum of money for that purpose. He published statistics and miscellaneous information of the Six Nations, in 1847, and from time to time added additional volumes, the sixth of the series appearing in 1857. The title of this work is "Historical and Classical Information Respecting the History, Condition, and Prospects of the Indian Tribes of the United States." Other works from his pen include "The Indian in His Wigwam," "Thirty Years with the Indian Tribes of the Northwestern Frontier," "Myth of Hiawatha and Other Legends," "Notes on the Iroquois," "Red Race of America," and "Lectures on the Indian Languages."

SCHOOLS, the institutions maintained for giving instruction in arts, sciences, languages, or any other branches of learning. Schools in the widest sense include all establishments for systematic instruction of any kind or grade, from the kindergarten to the university, whether of a private or public character. Education in the earliest periods was mainly domestic, being conducted by the parents, and its character was largely religious. Writers generally agree that public schools existed in the time of Babylonia and that they were introduced among the Hebrews shortly after the return from Babylonian captivity. The ancient Greeks maintained public educational institutions for the training of the young, not only in elementary branches, but in industrial arts, sciences, and languages. Schools of a like character were maintained by the Romans. In the Middle Ages educational institutions sprang into existence in many parts of Western Europe, but the schools were for centuries largely in the hands of the clergy and

comparatively few of the laymen acquired ability to read and write. This condition was favored by the extended discussion of the scholastics in relation to hair-splitting theories of ancient philosophy and ecclesiastical discipline.

This condition continued unchanged until the revival of letters, when thought began to be directed toward the investigation of natural sciences and the organization of schools well calculated to train the child from infancy, according to recognized and salutary methods of instruction. In this period two great classes formed, the one holding that it is the duty of the state to supervise the education of the child from its first attendance at school until at least the elementary branches are mastered successfully, the other promoting the view that instruction should be under the guidance of the church. However, both classes became impressed with the need of making instruction more nearly fitted for the wholesome and progressive development of youth, being in this respect influenced by the eminent teachers of Western Europe, including Pestalozzi, Froebel, Herbart, Rousseau, Rosenkranz, Ratich, Richter, Schlegel, and many others. Instead of making instruction conform to the dead formalities of ancient philosophies, these teachers directed attention to the laws of mind growth and development, and brought the child and teacher in contact with the living and vitalizing influences of nature and first principles.

PRIVATE OR PUBLIC INSTRUCTION. The two parties advocating private and public education are still represented in large numbers, both in America and Europe. The term *private education* implies the instruction given by tutors or in schools other than those supported by the state, including the schools maintained by various religious denominations, societies, and numerous other organizations. These schools in some places have come in conflict with public schools, since the withdrawal of a part of the children from the latter has decreased their enrollment. Again, they have obliged those patronizing private schools to pay double support—taxes to the public schools and voluntary appropriations to the private. In some countries private schools receive partial support from the government, as in Ontario and Quebec, but in the United States no such aid is given, and all the parochial and other private schools are maintained voluntarily.

The advocates of private schools maintain them for two principal reasons, one being that religious instruction of a definite character is excluded from the public schools, and the other that private schools offer to the parent the particular branches of study and forms of instruction that are wanted for the child. On the other hand, those who advocate education in public schools are of the general opinion that the child should be trained with a special view of fitting him for citizenship, and, to accomplish this to the best purpose, they think it necessary that the

state should prescribe a course of study and require attendance until at least the elementary branches have been completed successfully. While all advocate the highest form of moral instruction, they regard it possible to give a sufficient amount of religious or sectarian training in Sunday schools and churches and during the period of vacation.

SYSTEMS OF SCHOOLS. It is generally admitted that the first public and free school in America was founded by the Dutch in New York, but others were established soon after, the earliest in Massachusetts dating from 1635. The remark made by Governor Berkeley, in 1670, that he thanked God that there were no free schools in Virginia, is often quoted as an evidence that a free and intelligent people are not easily suppressed by tyrants. The public schools of the United States and Canada are not organized on a national basis, but they are under the direct control and supervision of the states and provinces. In this respect they are like those of Germany. Both governments have given aid to the establishment and maintenance of many institutions of learning by the reservation of public lands and by making appropriations for special purposes. The total amount of land appropriated in the United States is 78,889,839 acres. Of this land granted for educational purposes, 67,892,919 acres were appropriated to aid common schools; 9,600,000 acres, to aid mechanical and agricultural schools; and 1,395,920 acres, to support universities. A national commissioner of education is maintained to conduct the Bureau of Education, whose object is to gather statistics of general interest and to give aid by publishing and otherwise disseminating educational intelligence.

It may be said that there are as many educational systems as there are states and provinces, but they are similar in many respects. In most instances the schools are under a superintendent or minister of education, or an officer having similar executive duties. He is aided in the work of superintendence by county superintendents or similar officers, who have general supervision of the common schools in their respective counties. City superintendents are in most cases appointed by boards of directors in the larger cities and principals are similarly chosen in the towns. In some cases supervisory officers have charge of the schools in the townships. Revenues to maintain the schools are derived from various sources, of which the principal ones are state or provincial school taxes, local taxes, and permanent school endowments. All these are utilized in most instances, but in addition there are other sources of revenue, such as license taxes, fines, and penalties, and in some states poll taxes.

The common schools give instruction in the common branches of education, corresponding to the elementary schools of England and the *Volks-schulen* of Germany. In some states com-

mon schools are the only educational advantages provided in rural districts, but others have township or county high schools. Towns and cities have both elementary and high schools, and in many of the larger cities kindergarten and special schools of various kinds are maintained. In others the same results are obtained by the employment of special teachers in the public and private schools.

Universities and colleges are maintained by all the states, the revenues being secured under state taxation. Normal schools for the professional training of teachers are supported by state taxation, and in most cases a small contingent fee is charged those who attend. Some states maintain a number of normal schools, while others have only one, but in such cases provisions are made for normal instruction to be given in various high schools. Teachers' institutes are inspirational schools with a short course of study. They are designed to inspire educationally and professionally the teachers already in the work and those intending to become teachers. Practically all the states have ample provision for the training of incorrigible children and for the care of the criminal, defective, and dependent classes. Manual training schools and other institutions with special courses are maintained in some states. Laws requiring attendance for a limited period have been enacted in most cases, as in Illinois and Massachusetts, and the period for school attendance is generally fixed by law from the age of six to fourteen years. The prohibition of child labor in mines and factories has greatly facilitated educational advancement, and friends of education generally look upon this as wholesome for both private and public schools. The lowest per cent. of illiteracy in the United States is in the states of the central west. This corresponds somewhat to the condition in Canada, where the lowest per cent. of illiteracy is in the south central provinces. See **Education**.

SCHOOLS OF CORRESPONDENCE, a class of educational institutions which teach and examine their students by correspondence. This system had its beginning in Germany in 1856, being originated as a means to furnish instruction to those who are unable to attend institutions of higher learning, such as academies and universities. At first the instruction was limited largely to training in certain industrial arts, especially in surveying and architecture. From this beginning a large number of greatly diversified courses originated. These courses now cover practically the entire field of learning.

The general plan of conducting schools of correspondence requires enrollment for instruction for a definite time, usually not less than three months, but the greater number of courses cover a line of work for four years. Students receive their lessons by mail or express, doing the work at home, and examinations required at the end of a term are under the direct super-

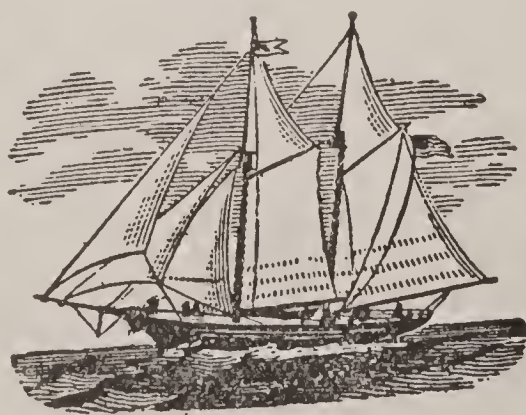
vision of some responsible person appointed for that purpose, usually a local justice of the peace or a teacher or principal of schools. The matter of conducting such an examination is merely supervisory, since the questions are furnished by the school or university with which the school of correspondence is associated, and the written examinations are returned and graded by examiners in the home school or office. The University of Chicago developed a scheme for conducting instruction by correspondence, offering courses in about thirty departments, but students who expect to receive a degree are required to take two-thirds of the work by attendance upon the institution. The International Correspondence School at Scranton, Pa., is one of the largest of the kind in the world. Institutions of this kind are now maintained by many colleges and universities, while others are organized by corporations which conduct the work entirely by correspondence.

The lessons were originally sent out in circular form, but now they are more generally published in a series of books. These books or volumes are sent to the student from time to time as he progresses in his study, or he may purchase the entire course and have it delivered to him at the beginning, but the rules require that each student proceed in regular order and that the promotions are based upon examinations at the end of each quarter. In this scheme the personal contact between the teacher and student is replaced with notes and queries sent by mail from time to time. Although all schools of correspondence grant degrees at the completion of the courses, personal attendance is required for at least a part of the time in the larger number of institutions. The phonograph has become an important factor in teaching modern languages by correspondence, making it possible that the instruction and the examination be dependent in a large measure upon the articulation and pronunciation as expressed by both the instructor and the learner.

SCHOONER (skōon'ēr), a sailing vessel with two or three masts. Vessels of this class are built for fast sailing and are provided with fore-and-aft sails. Many kinds of schooners are employed, but the two chief classes are those known as *fore-and-aft rigged* and the *topsailschooner*.

The former are provided with fore-and-aft sails on two masts, and vessels of the latter class carry a square topsail and topgallant sail. Schooners provided with three masts carry fore-and-aft sails on each mast.

SCHOPENHAUER (shō'pēn-hou-ēr),



SCHOONER.

Arthur, eminent philosopher, born in Dantzic, Germany, Feb. 22, 1788; died Sept. 21, 1860. He was a son of Johanna Schopenhauer (1770-1838), an authoress. After securing a secondary education in his native city, he was trained under the direction of his father for a business career. However, he became interested in literature and entered the University of Göttingen, but later studied at the universities of Berlin and Jena, graduating from the latter in 1813. His university study brought him in contact with the lectures of Fichte and Schleiermacher, who induced in him a love of philosophy. At the time of his graduation he presented an essay that contains the basis of his system, entitled "The Fourfold Root of the Principle of Sufficient Reason." He lived with his mother at Weimar from 1814 to 1818, where he enjoyed the society of Goethe and other men of high culture. Shortly after he settled at Dresden and published a work entitled "Sight and Color." In the same year he made a visit to Rome and Naples, and spent his time in Italy from 1822 to 1825. In 1831 he settled at Frankfort-on-the-Main, where he devoted himself to literary research and the development of his system of philosophy.

The fundamental doctrine of Schopenhauer is that will is the only essential reality in the universe. According to it, the phenomena we call appearances exist only in subjective representations and constitute mere forms under which will is shown. He asserts that will is not necessarily accompanied by self-consciousness, but it strives to attain that end. In this he opposes the doctrines announced by Fichte, Hegel, and Schelling, who regard consciousness as a necessary basis of thought. Schopenhauer advocated a form of ethics based on a thorough pessimistic theory of existence, its ideal being the negation of the will to live. He led a solitary life, had few intimate friends, and through an apparently natural disposition to despise women he never married. In several of his writings he made attacks upon a number of philosophers who differed from him, but his works attracted little attention until many years after his death. At present his views have a wide influence on philosophical speculation. His writings embrace "The World Considered as Will and Idea," "Freedom of the Will," "Will in Nature," "Fundamentals of Morality," and "The Two Basic Problems of Ethics."

SCHOULER (skōō'lēr), **James**, historian, born at Arlington, Mass., March 20, 1839. He studied at Harvard University, where he graduated in 1859, and took up the practice of law in Boston. In 1862 he joined the Federal army for service in the Civil War, but resumed his practice the following year. He was made a lecturer in Boston University in 1884, and subsequently held like positions at the National Law School in Washington and at the Johns Hopkins University. His most important work is entitled "History of the United States Under the

Constitution," which embraces the history of the nation subsequent to the colonial period. Other publications include "The Law of Personal Property," "Constitutional Studies," "The Law of Wills," "The Law of Husband and Wife," "The Law of Domestic Relations," and "Life of Thomas Jefferson."

SCHUBERT (shōō'bērt), **Franz Peter**, eminent German musical composer, born in Vienna, Austria, Jan. 31, 1797; died Nov. 19, 1828. His father was a schoolmaster in Leopoldstadt and began to give him instruction in music at the age of seven years. His voice attained such culture and beauty that it attracted sufficient attention to admit him into the choir of the imperial chapel in 1808. The succeeding five years he studied the violin and received training in singing at a school called the Convict, but a temporary failure of his voice caused him to leave that institution in 1813. Subsequently he was taught for three years in the school of his father. He soon turned his talent to profitable use by teaching music and composing. Schubert was early skilled on the piano and many other musical instruments, and by 1815 composed five operas, two symphonies, and 137 songs. In the meantime his father became teacher at Lichten-thal, where he attended until reaching the age of eighteen years.

In 1819 the musical friends of Schubert secured the presentation of his song "The Shepherd's Lament" at a concert in Vienna, as well as his comic operetta "The Twins," thereby bringing his productions to public notice. From that time he was aided financially by a large sale of his productions. In 1825 he made a tour of Austria and Germany, meeting everywhere with enthusiastic receptions. Schubert was not only an able and tireless writer of music, but produced compositions with such rapidity that he astonished even his friends. It appeared that he could not refrain from writing when his genius became inspired with an idea. His entire compositions include six masses, ten symphonies, fifteen operas, and 600 songs. His "Seventh Symphony" is regarded the most beautiful and ranks with those of Beethoven. Other productions that would alone entitle him to high repute include "Hark, Hark, the Lark," "Rosamond," "Enchanted Harp," and "Fierabras." The principal collections of his songs include "Müllerlieder," "Winterreise," and "Schwanengesang." His death at the early age of 32 years was brought on by excessive work, terminating in a sudden delirium on Oct. 13, from which he never recovered.

SCHUMANN (shōō'män), **Robert**, musical critic and composer, born in Zwickau, Germany, June 8, 1810; died near Bonn, July 29, 1856. He first studied law at the University of Heidelberg, but his ambition to excel as a pianist induced him to devote himself to music. After studying for some time, he sustained a permanent disablement of one of his fingers whereby he was com-

pelled to devote himself exclusively to the composition of music. In 1840 he married Clara Wieck (1819-1896), daughter of Friedrich Wieck, one of the most eminent pianists of that period. He established *The New Magazine of Music* in 1834, with which he was connected ten years, and made it an important influence in developing musical art and bringing his productions to public notice. Few composers labored with greater devotion to add substantially to the finer musical productions, many of his compositions being of the highest class, notably the cantata "Paradise and the Peri," and his greatest orchestral work, entitled "Symphony in B."

Mendelssohn had located in Leipsic in 1835, where he and Schumann lived upon the warmest terms of friendship. Their numerous productions made that city the musical center of Germany. Schumann was made professor of composition in the conservatory of music founded at Leipsic by Mendelssohn in 1843, and in 1850 became musical director at Düsseldorf, a position he retained till 1853. His mind became clouded in the latter year, and he was soon after confined to a hospital near Bonn, where his death occurred. The musical compositions of Schumann include a number of symphonies, cantatas, concertos, and orchestral works. He contributed largely to the literature of art, being the author of a number of valuable essays and criticisms. Among his works not named above are "Scenes of Childhood," "Kriesleriana," "Carnival," "Papillons," "Etudes Symphoniques Fantasia," "Overture Scherzo," "Genevieve," "Finale," and "Manfred." His wife made his music highly popular in Europe by playing with marked success in many of the leading cities, and before her death he attained a rank among the greatest composers. He was one of the leading representatives of the Romantic school.

SCHUMANN-HEINK, Ernestine, contralto singer, born at Lieben, near Prague, Bohemia, in 1861. She descended from a German family by the name of Roessler, studied music at Gratz, and made her début at Dresden in 1878. In that city she sang with marked success a period of four years, and in 1883 became connected with the Stadttheater at Hamburg. In the same year she married Heink and ten years later became the wife of Paul Schumann. She sang with much success in the leading cities of Canada and the United States, where she toured in 1898, and several times afterward. Her leading rôles were *Azucena* in "Il Trovatore" and the *First Norm* in "The Ring of the Nibelungen."

SCHURMAN (shoor'man), **Jacob Gould**, educator, born at Freetown, Prince Edward Island, May 22, 1854. He studied at the Acadia College, Nova Scotia, and at the University of London, and was granted a degree by the latter in 1877. Subsequently he studied at the German universities of Berlin, Heidelberg, and Göttingen, and in 1880 was made professor of English literature at Acadia College. In 1882 he became pro-

fessor of English literature and philosophy at Dalhousie College, serving until 1886, when he was made professor of philosophy at Cornell University. In 1892 he succeeded Charles Kendall Adams as president of Cornell University, and in 1899 became chairman of the first educational commission in the Philippine Islands. His influence as a teacher and writer on educational topics is extensive. Among his publications are "Ethical Import of Darwinism," "Agnosticism and Religion," "Kantian Ethics and the Ethics of Evolution," "Belief in God," and "Philippine Affairs."

SCHURZ (shoorts), **Carl**, statesman and journalist, born in Liblar, Germany, March 2, 1829; died May 14, 1906. He studied at Bonn until 1848 and the following year took part in the Revolution. After engaging in the unsuccessful defense of Rastadt, a fortified town of Baden, he was compelled to flee to Switzerland. He removed to the United States in 1852, residing first at Philadelphia, but later settled in Watertown, Wis. He established a successful law practice at Milwaukee in 1859, where he became prominent as a leader among the Germans, and was closely identified with the organization of the Republican party. In 1860 he gave active support to Lincoln, who appointed him United States minister to Spain in 1861, but he soon after resigned to enter the army. He was made brigadier general of volunteers in 1862, and the following year became major general, commanding in the Second Battle of Bull Run, Chancellorsville, Gettysburg, and Chattanooga.

Schurz settled in Saint Louis soon after the war, where he edited the *Westliche Post* and in 1869 was made United States Senator. In 1872 he supported Horace Greeley for President, removed to New York in 1875, and in 1876 made an active canvass for Rutherford B. Hayes, who selected him as Secretary of the Interior. He edited the *New York Evening Post* from 1881 to 1883, and the following year actively supported President Cleveland on the issue of civil service reform. In 1896 he made an active campaign for President McKinley on the issue of a single gold standard, and in 1900 supported W. J. Bryan on account of his opposition to the war policy of the Republican party. Schurz ranks as one of the most influential speakers and writers of the United States. He is noted particularly for his independence in political discussions. He wrote one of the best biographies published of Henry Clay. His noted speeches include "Abolition of Slavery as a War Measure," "Irrepressible Conflict," and "Eulogy on Charles Sumner."



CARL SCHURZ.

SCHUYLER (ski'lēr), **Philip**, soldier, born in Albany, N. Y., Nov. 22, 1733; died there Nov. 18, 1804. His father left to him a large estate, much of which he turned to good account in aiding the American colonies. From 1755 to 1758 he served in the British army against the French, and was promoted to the rank of major. He sat as a delegate in the Continental Congress at Philadelphia in 1775, and was made one of the four major generals first appointed to serve in the Revolutionary army. Immediately he proceeded to Ticonderoga with the design of invading Canada, but poor health obliged him to return to Albany and give up his command to General Montgomery, and there discharged the duties of commissary general. After serving as a representative in Congress, in 1777, he became chief of military in Pennsylvania, and subsequently was given command of the Northern department. He was present when Burgoyne surrendered at Saratoga, assisting General Gates in making necessary arrangements, but in 1779 resigned his command and served as a member of Congress. Schuyler was not only a trusted friend and adviser of Washington, but aided the public treasury by making advances from his private resources. He was elected United States Senator from New York in 1789 and again in 1797. As a member of the New York Legislature he contributed largely to the code of laws, and aided in promoting the canal system in the State. His influence in politics was with the Federal party.

SCHUYLKILL (skoōl'kīl), a river in Pennsylvania, the largest tributary of the Delaware. It rises in Schuylkill County, near Pottsville, and, after a course of 130 miles toward the southeast, enters the Delaware at Philadelphia. The Schuylkill flows through a rich mining and agricultural country, supplies excellent water power, and is one of the most beautiful features of Fairmount Park, Philadelphia. It furnishes that city its water supply and is navigated by canal boats, by means of dams and locks, to the coal region in Schuylkill County. Among the thriving cities on its banks are Philadelphia, Phoenixville, Reading, Norristown, and Pottsville.

SCHWANTHALER (shvān'tā-lēr), **Ludwig Michael**, sculptor, born at Munich, Germany, Aug. 26, 1802; died Nov. 2, 1848. He studied sculpturing under his father and at the Academy of Munich, where he was made professor in 1835. For some time he studied and worked in Rome, where he executed many noted works of art. His monuments include those of Goethe at Frankfort, the one of Mozart at Salzburg, and the one to Jean Paul at Bayreuth. Among his statues are those of Louis of Hesse at Darmstadt, of Charles Frederick of Baden at Karlsruhe, and of Frederick Alexander of Brandenburg at Erlangen. He executed 15 figures of the Battle of Arminius, in the pediment of the Walhalla at Regensburg; 24 statues of painters,

in the New Pinakothek; and the colossal bronze statue of Bavaria, 65 feet high, in Munich.

SCHWATKA (shwōt'kā), **Frederick**, Arctic explorer, born in Galena, Ill., Sept. 29, 1849; died in Portland, Ore., Nov. 2, 1892. He graduated from the West Point Military Academy in 1871 and until 1877 served as lieutenant of cavalry. In the meantime he was admitted to the Nebraska bar and secured a medical degree in New York. He was made commander of an expedition to King William's Land in 1878. His company discovered the remains of Sir John Franklin's party and secured information of value regarding its adventures. After many hardships and a sledge journey of 3,250 miles, the party returned to the United States, in 1880. In 1884 he explored the course of the Yukon in Alaska and had charge of an expedition sent by the *New York Times* into Alaska in 1886, when he ascended Mount Saint Elias to a height of 7,200 feet. In 1889 he conducted an expedition to study the remains of cliff and cave dwellers and of the Aztecs in Mexico, and in 1891 made another expedition to Alaska. Among the honors bestowed upon him are medals from the Imperial Geographical Society of Russia and the Geographical Society of Paris. He wrote "Nimrod of the North," "Along Alaska's Great River," and "Children of the Cold."

SCHWEINFURTH (shvīn'fōort), **Georg August**, German explorer and naturalist, born in Riga, Russia, Dec. 29, 1836. He first studied at Riga, but later at Heidelberg, and conducted scientific excursions to study botany in France, Russia, and Italy. Between 1864 and 1871 he made three tours to Egypt, where he studied the flora and fauna of the Nile basin. He made extended explorations of the oases in the Libyan desert from 1873 to 1875, and in the latter year was appointed by the Khedive of Egypt as director of the Cairo Museum of Natural History. From 1876 to 1878 he made explorations of the region between the Red Sea and the Nile, explored the island of Scotia in 1881, and subsequently promoted German colonization in the equatorial regions of Africa. Many valuable collections of natural history were sent by him to the National Museum of Germany. His writings include "In the Heart of Africa," "Flora of Ethiopia," and "Plants and Plant Life."

SCHWERIN (shvā-rēn'), a city of Germany, capital of Mecklenburg-Schwerin, 60 miles east of Hamburg. It is beautifully located on Lake Schwerin, a body of water fourteen miles long and three miles wide. The noteworthy buildings include the Grand Ducal Library, the palace of justice, the public theater, the gymnasium, and many churches. It is the seat of a fine Gothic cathedral founded in 1248, and near it is a ducal castle erected by Wallenstein. In front of the theater is a statue of Rauch. The manufactures include tobacco and cigars, clothing, earthenware, cotton and woolen goods, carriages, and machinery. It is first mentioned in

1018 and became a municipality in 1161. Population, 1905, 41,628; in 1920, 44,286.

SCIENCE, the sum of universal knowledge. In a more limited sense the term is applied to any department of knowledge gained and verified by exact observation and correct thinking. According to the former definition it resembles philosophy, which deals with the whole sum of knowledge, but as limited by the latter it deals with a particular department of knowledge concerning some subject or group of subjects. In the beginning of study it was necessary to collect and observe facts, then to form them into a system and reduce the generalizations to laws; and finally to proceed to some principle accounting for these laws. It is clearly shown by history that many laws long accepted were overthrown by subsequent investigation, but in the course of time it became possible to demonstrate the truth of certain basic principles that are now accepted generally. The five divisions of science include mathematics, treating of quantity; physics, treating of matter and its properties; biology, treating of the phenomena of life; anthropology, treating of the phenomena of mankind; and theology, treating of the Deity.

Another classification of the sciences divides them into applied, or practical, sciences, and pure, or theoretic, sciences. The former include those that treat of the knowledge of facts or events accounted for or produced by definite laws, and the latter embrace the knowledge of these laws as considered apart from all application. *Pure*, or *fundamental*, sciences include mathematics, psychology, physics, sociology, and chemistry. The *applied*, or *concrete*, sciences embrace botany, meteorology, mineralogy, geology, geography, zoölogy, law, ethics, politics, grammar, jurisprudence, rhetoric, logic, philology, engineering, economics, surgery, medicine, and many others. The development of the sciences may be traced through different stages of evolution, the initial periods being found in remote antiquity.

Man's desire to ascertain his proper conduct toward his fellows and his Creator caused moral science, a department of mental science, to be the first to attain some degree of maturity. The next to receive attention was mental science, or the study dealing with the power to think, feel, and will, but slow progress was made in the latter. As a result psychology as a branch of knowledge is in its conclusions still far from certainty. Many myths of the ancients were hypotheses connected with natural phenomena, and in them may be found the beginning of physical sciences. Progress in the physical sciences was slow until the beginning of the 18th century, when they began to develop with remarkable rapidity, and knowledge connected with them surpassed the advances made in astronomy, physics, chemistry, and botany, though all these had received attention long before. Little study was given to geology before the 19th century,

while anthropology, comparative religions, and other allied sciences are materially newer.

No one can be a successful student of science unless he considers truth of prime importance and is willing to sacrifice preconceived notions whenever he discovers new truths to render the formerly accepted views erroneous. The expenditure of money, time, or even life is not considered useless if the student adds fresh truth, or even paves the way for the addition of valuable discoveries. No limit to the field of discovery can be conceived, although at times mankind was led to believe that human ability to add to knowledge had been exhausted. However, modern discoveries demonstrate conclusively that there are still fields as productive as ever confronting the seeker for scientific extension. This is evidenced by turning to practical account through scientific inquiry such resources as culminated in the application of telegraphy, steam, electricity, and many others of vast importance.

SCILLY (sī'lī), an island group belonging to the British Isles, situated 28 miles southwest of Land's End, England. The group includes about 35 islands, but only 6 possess any importance, the others being formed largely of rocks. These islands belong to and form a part of Cornwall County. Saint Mary's Island is the largest, having an area of 1,528 acres. The climate is moist and variable, and the principal products are vegetables and spring flowers, which are transported to the London market. Deposits of tin and granite abound and the fisheries are of value. The islands were conquered by Athelstan in 938 and were granted to some monks, who formed settlements on the island of Tresco. Sir Francis Godolphin secured a lease of them from Queen Elizabeth and they remained in possession of his family for 250 years, but are now the property of the crown. Population, 1918, 2,160.

SCIO (sī'ō), an island in the Aegean Sea, 7 miles off the coast of Asia Minor, 52 miles west of Smyrna. It is 32 miles long, 17 miles wide, and has an area of 400 square miles. The climate is favorable. Among the chief productions are silk, cotton, wine, mastic, cereals, and many species of fruits. Horses, cattle, swine, and sheep are grown. It has valuable fisheries and manufactures of silk and woolen goods, confectionery, carpets, and clothing. Formerly the island was populated entirely by Greeks, but in 1822 the Sciotes joined the revolution against Turkey, when many were massacred. Scio holds a prominent place in ancient history and contends for the honor of being the birthplace of Homer. Kastro, population 18,975, is the capital. Population of the island, 1918, 71,486.

SCIOTO RIVER (sī-ō'tō), a northern tributary of the Ohio, which rises in Auglaize County, western Ohio, and after a course of 285 miles toward the east and south, flows into the Ohio River at Portsmouth. The Scioto valley is fertile, producing large quantities of cereals, fruits, and live stock. The river is navigable

during high water about 130 miles from the mouth and is of importance in connection with the Ohio and Erie Canal. The chief tributaries are the Whetstone and Derby.

SCIPIO (sĭp'ī-ō), **Publius Cornelius**, called Africanus Major, eminent Roman soldier, born about 234 B. C.; died 183 B. C. The first mention of him is made in connection with the Battle of the Ticinus in 218 B. C., where he saved the life of his father, Publius Cornelius Scipio, who was the first Roman general to encounter Hannibal in battle. Soon after he was made military tribune, and in 216 B. C. took part in the Battle of Cannae, from which disastrous field he escaped to collect the remains of the Roman army and save the capital. In 212 B. C. he became aedile, though still under age, and in the following year was appointed proconsul of the Roman army in Spain. His successful campaign began with the defeat of the Carthaginians at New Carthage, and the capture of other cities followed in rapid succession. He defeated Hasdrubal, brother of Hannibal, in 209 B. C., and soon after drove the Carthaginian army entirely from Spain.

Scipio was commissioned to carry the war into Africa, but Hannibal was recalled from Italy to meet him in battle at Zama, where he defeated the Carthaginians on Oct. 19, 202 B. C., and thus ended the struggle for Roman supremacy over Carthage. On returning to Rome he was given a magnificent triumph, received the surname of Africanus, and was offered the dictatorship for life, but declined. Soon after he was sent against Antiochus, King of Syria, and when the war against that monarch terminated successfully, in 189 B. C., he retired to private life. Two years later his brother, Lucius, was prosecuted for receiving bribes from Antiochus while in Syria, and later Scipio was charged with being implicated, but the senate ended the prosecution on the anniversary of the great Battle of Zama. Scipio was considered the ablest general of Rome before the time of Julius Caesar, and is described as a man of remarkable bravery, courtesy, and pious faith in the gods. Cornelia, his daughter, was the mother of the Gracchi. His death occurred at Campania, his country home, it is believed the same year in which his great opponent, Hannibal, died.

SCIPIO, **Publius Cornelius**, called Africanus Minor, Roman soldier, born in 185 B. C.; died in 129 B. C. He was the son of the great conqueror of Macedon, Lucius Aemilius Paulus, and became adopted by Publius Scipio, son of Scipio Africanus Major. He was with his father at the decisive battle of Pydna, in Macedon, in 168 B. C., and while in Greece formed a lasting friendship with Polybius, the historian. In 151 B. C. he was sent as military tribune to Spain and at the beginning of the third Punic War, in 149 B. C., led a Roman army to Africa, where he began the siege of Carthage. The senate made him consul in 147 B. C., though not of legal age, and he thus became the leader of the army

against the Carthaginians, in which capacity he stormed Carthage the following year. The ruin and completed destruction of that city were regretted sincerely by him.

It is said that as Scipio beheld the destruction wrought by the army in Carthage, he thought of the future fate of Rome, uttering at the same time the words of the "Iliad":

"The day shall come when sacred Troy shall perish,
And Priam and his people shall be slain."

On returning to Rome, he was honored with a triumph, and was surnamed Africanus. He became censor in 142 B. C., ambassador to Egypt and Asia in 139 B. C., and was reëlected consul in 134 B. C. In the latter year he was sent to Spain, where he conquered Numantia after a siege of eight months, and destroyed and sacked the city. His political life at home was not highly successful, since he created much opposition by opposing the agrarian law of Tiberius Gracchus and generally sympathized with the leaders of the aristocratic party. It is thought that his death resulted from violence by instigation of leaders opposed to him politically, for the reason that he was found dead in his bed.

SCISSORSBILL, or **Skimmer**. See **Skimmer**.

SCONE (skōn), a town of Scotland, on the Tay River, two miles north of Perth. It is celebrated for its monastery, first mentioned in the early part of the 10th century, in which the kings of Scotland from 1153 until 1458 were crowned. It contained the famous Stone of Destiny on which the kings of Scotland were inaugurated, which was taken to Westminster Abbey by Edward I. in 1296.

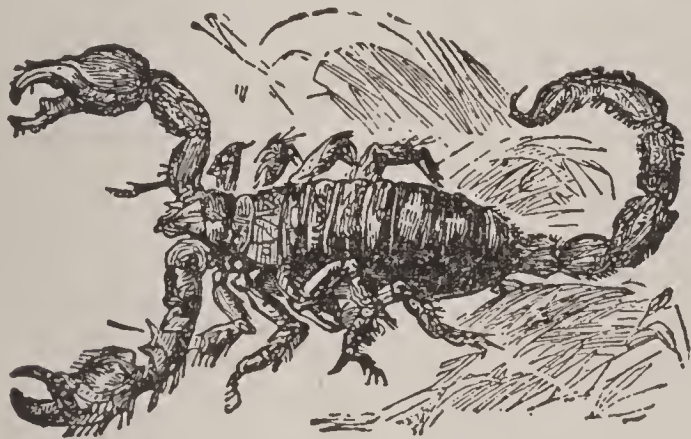
SCORESBY (skōrz'bī), **William**, explorer, born near Whitby, England, Oct. 5, 1789; died March 21, 1857. He was the son of a whaler and accompanied his father to Greenland during the summer, but studied at the University of Edinburgh in winter. In 1876 he was the chief officer of the ship *Resolution*, with which he sailed to 81° 30' north latitude, the most northerly point reached up to that time. He explored the eastern coast of Greenland in 1821, and the following year surveyed and chartered about 800 miles of the winding coasts. In 1856 he made a voyage to Australia for the purpose of studying terrestrial magnetism in that continent. He published "Journal of a Voyage," "History and Description of the Arctic Regions," and "Journal of a Voyage to Australia for Magnetic Research."

SCORPIO (skōr'pī-ō), or **Scorpius**, the eighth sign of the zodiac. This constellation is now situated in the sign Sagittarius, owing to the precession of the equinoxes. It contains Antares, a bright red star, and on each side of it is a smaller star. See **Zodiac**.

SCORPION (skōr'pī-ŭn); the name of an extensive genus of insects, native to the warm climates of both hemispheres, belonging to the same family as the spiders. The body is elon-

gated, usually from two to six inches, and somewhat resembles that of small lobsters in shape. They have a long, narrow, flexible tail, which is capable of being curved over the back and terminates in a poisonous sting. Six broad segments are found in the abdomen and six narrow ones in the tail. The sting consists of a curved and sharp modification of the last segment. They are provided with six, eight, or twelve eyes, and have eight legs and two large claws resembling those of the lobster. The scorpions frequent dark places during the day, usually seeking shelter under stones, but at night come out in search of food. It is not uncommon to find them in hiding under pillows, boots, and other objects in warm climates, where they are disliked and dreaded. Their sting, though painful and poisonous, is not usually, if ever, fatal to man.

Scorpions are found in abundance in Southern Asia and Europe, Northern Africa, Australia, and the tropical parts of America. The *black*



SCORPION.

scorpion has a body about six inches long. Its sting is very poisonous. Several small species are native to the southern part of the United States. The so-called *rock scorpion* is a familiar kind. Another group of insects allied to them is the *book scorpions*, but they are smaller and do not possess the jointed tail common to the true scorpions. They live in or among books, where they subsist on minute insects that frequent such places. The true scorpions feed on spiders and insects. From thirty to sixty young are brought forth from eggs at a time and are carried on the back of the mother during early life.

SCORPION FISH, the name of several species of fishes of the gurnard family. The common scorpion fish of the Pacific coast, found off the shores of California and Mexico, is sold extensively on the market. It is a foot in length and has a brownish color, tinted with rosy and olive shades. Several species are found in the Mediterranean and off the Atlantic coast of Southern Europe, including the red and the spotted scorpion fishes.

SCORPION FLY, the name of several insects related to the dragon flies, so called from the terminal segments of the abdomen being mobile and elongated. The outer segments are curved over the back similar to the tail in the

true scorpion, and in some species a pair of forceps are attached to the last joint. When excited and irritated, the forceps are used as offensive and defensive weapons. These insects have four wings, through which many veins permeate, and the head is prolonged in the form of a beak. The larvae feed upon insects and dead animals, while the adults subsist largely on juices of plants. Many species are common to Canada and the United States, including some wingless forms.

SCOTCH TERRIER. See **Terrier**.

SCOTLAND (skõt'land), a political division of the United Kingdom of Great Britain and Ireland. It is situated north of England, from which it is separated by the Cheviot Hills, the Tweed River, and the Solway Firth. All the remainder of the boundary is formed by the Atlantic Ocean, which extends into its shores by numerous indentations of such extent that practically all parts are within forty miles of the sea. The length from north to south is 285 miles and the width varies from 25 to 145 miles. Including the adjacent islands, it has an area of 39,785 square miles.

DESCRIPTION. Scotland is remarkable for its extensive coast indentations, which give a coast line of about 2,500 miles. The most important indentations include the Firth of Forth, the Firth of Tay, Moray Firth, and Dornoch Firth on the east, and the Firth of Lorne, the Firth of Clyde, and Solway Firth on the west. Between Scotland and Ireland extends the North Channel. About 800 islands are adjacent to its shores, of which the Orkney and the Hebrides are the largest groups. Along the western coast are numerous small islands, of which the principal ones are Arran, Bute, and the Cumbraes. The islands stretching along the coast from Islay to Skye are known as the Inner Hebrides, and these are separated from the Outer Hebrides by the straits of Minch and Little Minch.

Three natural divisions characterize the surface, including the southern uplands, the central lowlands, and the highlands of the north. The Grampian Hills form the larger part of the highlands and are located north of the Caledonian Canal, which connects the Firth of Lorne with Moray Firth. They include summits that rise somewhat more than 4,000 feet above sea level, of which Ben Nevis, the highest mountain in Great Britain, rises 4,406 feet. South of the Grampians are the central lowlands, which stretch from the Firth of Clyde to the Firth of Tay, and include many beautiful lakes and streams, connected largely by important canals, among them the Caledonian Canal from the west to the east. The southern uplands are formed largely by the Cheviot Hills, from which ranges stretch toward the north, culminating in peaks about 3,000 feet above sea level. Within this section are many fertile valleys, but the largest cultivated region of Scotland is in the **plain of Strathmore**, in the **central part**.

Most of the streams are valuable for the production of salmon and other fish, and the lower courses of many are important for their navigation facilities. The rivers flow chiefly toward the east into the North Sea. These include the Tweed, on the southern border, the Tay, the Forth, the Don, the Dee, the Spey, and the Findhorn. Among the rivers flowing toward the west are the Clyde, the Doon, the Nith, the Esk, and the Annan. Many beautiful lakes are found in various sections of the country, but especially in the mountains. Of these, Loch Lomond, area 28 square miles, is the most important. Other fine sheets of water include Doon, Dee, and Saint Mary's lakes, in the southern uplands; Leven Lake, in the central lowlands; and Tay, Earn, Awe, Rannoch, Shiel, Katrine, and Maree lakes, in the highlands of the west and north.

The climate of Scotland resembles that of England, but it is somewhat colder, owing to its location farther north and to its surface being somewhat higher. It is influenced by the warm waters of the Gulf Stream, which wash its western shore, but this is partly overcome by masses of floating ice from the Arctic Ocean. The thermometer rarely falls to zero in winter and the summer heat is seldom above 80°. Rainfall is heavier on the west coast than on the east, varying between 40 and 80 inches along the former and between 20 and 30 inches along the latter. In the western highlands the rainfall is excessive, reaching 130 inches. Snow lies on the ground for two or three months in the hills.

MINING. The country is rich in coal and iron and the output of both minerals is large. Coal is found in large deposits in the southern part, especially in Lanarkshire. Iron is mined in Ayrshire and Shropshire and lead is produced in Lanarkshire and Shropshire. The lowlands have deposits of mineral oil. Granite, slate, and limestone are quarried in large quantities for commercial purposes. Valuable clays are widely distributed.

FISHING. The fisheries yield large quantities of herring, haddock, cod, and salmon. Scotland has held high rank in the output of herring for centuries, the product being largely cured or canned for the markets in Great Britain. Dundee and Peterhead are headquarters for whaling fleets for the Arctic and Antarctic regions. Aberdeen is the most important fishing center of the eastern coast. The total output of the fisheries has an annual value of \$2,500,000.

AGRICULTURE. The cultivation of the soil is not profitable in many parts of the country, owing to its rugged and barren surface. Farming is confined largely to valleys and the lowlands, which are highly fertile and are cultivated with great care. Oats are grown on the largest parts of the cultivated area. Other cereals include barley, wheat, and rye. Turnips are grown extensively as stock food, and potatoes are everywhere an important crop. Grasses of all kinds yield well, especially clover, which is

grown extensively for hay and as a means of maintaining fertility. The highlands are utilized for grazing, especially in raising the Cheviot grade of sheep, which are native to Scotland. Many breeds of cattle are celebrated and have been naturalized in other countries, such as the Jersey, Ayrshire, Galloway, and Polled Angus. Shetland ponies and Clydesdale horses, two celebrated breeds, are grown extensively. Other domestic animals include swine and poultry.

MANUFACTURES About one-fourth of the people are engaged in manufacturing enterprises. These industries of Scotland have kept pace with those of England, both in quality and quantity. Cotton, linen, and woolen textiles comprise the most important manufactures. Glasgow is noted as a center of the iron and steel industries, especially in producing hardware and machinery, and extensive shipyards are located along the Clyde. Scotland has large interests in distilling and is unrivaled in the output of whisky of a high grade. Large publishing and printing establishments are maintained in Edinburgh and chemicals are manufactured in large quantities in Glasgow. Other products include glass, confectionery, pottery, boots and shoes, lace, silks, worsted goods, and machinery.

COMMERCE AND TRANSPORTATION. The trade of Scotland is closely identified with that of Great Britain and it carries a large share of the coastwise and foreign trade. Improvements on the Clyde River have made it possible for ocean vessels to reach Glasgow, which is the principal port of Scotland. A large volume of local traffic is carried through the Caledonian Canal, which is not sufficiently large for seagoing ships of modern manufacture. Railways have taken the place of many canals formerly maintained in the lowlands, but these are still of importance in handling a share of local traffic. At present the railways have a total of 3,750 miles, but the lines are confined chiefly to the region south of the Caledonian Canal, and the larger systems have direct connection with those of England and Wales. The highways are in a good condition, many being improved by a superior grade of macadam.

GOVERNMENT. Scotland forms an integral part of the United Kingdom and is represented in both branches of the British Parliament, having 72 members in the House of Commons and 16 representative peers to the House of Lords. At the time of the union, in 1707, the judicial system and the Church of Scotland were left intact. Two high courts are maintained, a court of session for civil cases and a judiciary for criminal offenses. For local government it is divided into 18 counties, presided over by county councils, and cities and burghs are governed by municipal bodies. In educational matters it has long been in advance of England and education is free in the borough schools, which are managed by local authorities. Four excellent universities are maintained, situated at Aberdeen, Edinburgh,

Glasgow, and Saint Andrews. These institutions receive aid from the government and are open to women and men under the same condition.

INHABITANTS. About one-tenth of the people are foreigners, consisting chiefly of English and Irish. Practically the entire mass of the Scotch people belong to the Presbyterian denomination, known here as the United Free Church of Scotland. A number of the inhabitants are Episcopalians and Roman Catholics, but the former are constituted mainly of English and the latter of Irish elements. The density of population is 150 to the square mile. Edinburgh, which has its seaport at Leith, is the capital. Glasgow, on the Clyde, is the largest commercial center. Other cities include Dundee, Aberdeen, Paisley, Kilmarnock, and Perth. In 1901 Scotland had a population of 4,472,103; in 1921, 4,959,521.

LANGUAGE AND LITERATURE. The Gaelic or Celtic tongue was spoken in northern and western Scotland down to the 15th century, but English was in general use in the lowlands toward the center and east. Peculiar characteristics prevail that still mark with local dialects the language spoken in different parts of the country, but there has been a constant tendency to make the language conform to the form spoken in northern England. The literature of Scotland may be said to date from 690, when Adamnan, abbot of Iona, wrote the life of his predecessor in the Latin. This was followed by other productions in the native dialect, but there were few writings of note until in the latter part of the 14th century, when Barbour wrote his famous work entitled "Bruce." Wyntoun's "Oryginale Cronykil of Scotland" appeared about 1422, and about the same time James I. wrote a number of poems, among them "King's Quhair." William Dunbar, Gawyn Douglas, and Sir David Lyndsay produced several works of high literary value in the latter part of the 15th century. A work on religion by John Hamilton, Archbishop of Saint Andrews, was published in 1552 under the title "Catechism, that is to say ane Com-mone and Catholike Instruction of the Christian People in Materis of our Catholike Faith and Religioun." In 1560 Sir Richard Maitland published a collection of satirical poems and Alexander Scott soon after wrote a number of domestic poems, among them "Jousting Betwixt Adamson and Sym." Other writers of this period include Alex. Montgomery, Sir William Alexander, and John Rolland.

Scottish literature was greatly influenced by the Reformation. Among the leading writers of that period are John Knox, James VI., and Sir David Lyndsay. The last named is noted particularly for his collection of songs published in 1597, entitled "Ane Compendious Booke of Godly and Spiritual Sangs for Avoiding of Sinne and Harlotrie." Allan Ramsay

(1686-1758) is the author of a collection of songs and short essays, entitled "Gentle Shepherd." Many songs, ballads, essays, and other productions belong to that period. Subsequently Scottish literature became interwoven with that of England, and an account of it will be found in the subject under English literature. Among the prominent writers of Scottish descent are Sir Walter Scott, Hector Macneill, James Hogg, Fergusson, Burns, Ramsay, John Galt, and George MacDonald.

HISTORY. The early history of Scotland is wrapped in obscurity and tradition, and the first definite information regarding its people dates from the time when Britain was occupied by the Romans. It appears that the early inhabitants were non-Aryan, closely resembling the Iberians. Later the *Scoti*, or *Scots*, invaded the country from Ireland, forming settlements in the northern part of England and the southern part of Scotland. The descendants from the original inhabitants became known as Picts, but they were called Caledonians by the Romans and the country was known as Caledonia. The Picts were most numerous in the latter part of the 5th century and with the colonization of the Scots, a Celtic people, a long line of controversies arose between these two predominating classes. In the 4th century a large Teutonic element from the north of Germany formed colonies near the Firth of Forth, which finally resulted in annexing the region south to the kingdom of Northumbria, whose boundaries extended from the Forth to the Humber River. In the meantime the Norsemen were establishing themselves on the Orkney and Hebrides islands.

The Picts and Scots were united into one kingdom under Kenneth MacAlpin, a Scottish ruler of Pictish descent, in the 9th century, and soon after the country became known as Scotland. Thirty-eight Pictish kings appear to have reigned and are mentioned in the history of Scotland, but in the latter part of the 9th century the Scots became the predominating influence and slowly united the independent chiefs in the north of Scotland to their dominion. Subsequently followed a long period of wars against the Norsemen on the north and the Britons and Saxons on the south. In 937 the Scottish king, Constantine, aided the Danes in a battle against the Saxon king, Athelstan, this being the first battle of importance fought on English soil. Malcolm I. (943-954) conducted a successful war against Edmund I. of England, which resulted in Cumbria being annexed to Scotland, and in 1018 Lothian, formerly a part of Northumbria, was annexed to England by Edmund II. The three succeeding kings of Scotland are Malcolm II., Duncan, and Macbeth, whose history is made a part of the tragedy of Shakespeare. Malcolm III. ascended the throne in 1057, after defeating the usurper Macbeth at Lumphanan, and with his reign

commenced a social and political revolution in Scotland. He married the English princess, Margaret, sister of Edgar Atheling of England, and thus the English language and customs were introduced.

At that time occurred the conquest of England by William the Conqueror, which was followed by a large number of Saxons leaving England and forming settlements in Scotland. Many serious struggles took place between Malcolm and the Norman invaders of England. He made two successful invasions of England, but William soon collected a large army and invaded Scotland, which resulted in a loss of territory to the former, and Malcolm and his eldest son were slain in 1093 while attempting to seize Alnwick Castle. Malcolm was succeeded by his three sons, Edgar, Alexander, and David. Of these David was the most successful. He reigned from 1124 to 1153, devoting himself earnestly to internal improvements and the spread of the Christian religion. When he ascended the throne Scotland had only a primitive civilization, but he founded schools, introduced a system of written laws, organized a representative legislature, and established the manners and language of the Teutonic race. He was succeeded by Malcolm IV. (1153-1165), in whose reign Cumberland and Northumberland were annexed to England. The latter was succeeded by William the Lion, who was taken prisoner in 1175 while attempting to regain Northumberland, and Scotland was declared dependent on England.

Scottish independence was restored in 1189 by Richard I., and at the death of William, in 1214, Alexander II. (1214-1249) succeeded to the throne. He was succeeded by his son, Alexander III. (1249-1286), whose reign gave importance and prosperity to Scotland, but his sudden death brought on the ambitious designs of Edward I. of England to make Scotland a part of his kingdom, as he had Wales. The situation was further complicated by the death of Margaret of Norway, who had been selected for the crown at a meeting of the estates of Scone, and soon after followed the long struggle of John Baliol, Robert Bruce, and David de Hastings. The dispute was settled by arbitration under Edward I. of England. He decided in favor of Baliol, who received the crown at Scone in 1292. Edward soon after invaded Scotland, took the king prisoner, and placed the entire country under English officials and garrisons. William Wallace and Robert Bruce now raised large armies to throw off English occupation and Edward I., dying in the meantime, was succeeded by Edward II. The latter was defeated by the Scots under Bruce at the Battle of Bannockburn on June 24, 1314, and Bruce reigned with remarkable success until his death in 1329, as Robert I.

Robert I. was succeeded by his son, David II., but Edward Baliol, son of John Baliol,

made pretensions to the throne and received powerful support from Edward III. of England. He was successful in a number of battles and was crowned at Scone in 1322, but David succeeded in defeating him shortly after and continued the war against England. He was succeeded in 1370 by his son, Robert II., who was the first Stuart on the throne of Scotland. After his death in 1390, his son, Robert III., succeeded to the throne, and at his death, in 1406, James I. became king under the regency of the Duke of Albany. Internal strife greatly disturbed the kingdom and resulted in James being held a prisoner in England for eighteen years, where he secured a liberal education and finally obtained his release, receiving the crown at Scone in 1423. He reformed the constitution of the parliament and established obedience to law, but was murdered at Perth in 1437. His son succeeded to the throne as James II. when only seven years of age, which again placed the country under a regency, and he was killed in the siege of Roxburgh Castle in 1460.

James III., now only eight years of age, became king. He married Margaret, daughter of the Norse king, Christian, and received the Shetland and Orkney islands, which have ever since belonged to Scotland. His reign was generally successful, but it was disturbed by the pretensions of the nobles, which finally resulted in a battle and his death at Sauchieburn in 1488. He was succeeded by his son, James IV., who, in 1503, married Margaret, daughter of Henry VII. of England, thus hastening the union of the two kingdoms. James formed an alliance with France and invaded England in the reign of Henry VIII., which resulted in his defeat and death at Flodden Field in 1513. His infant son succeeded him as James V., when only two years of age, under the regency of the Duke of Albany, but in 1528 attained to full government. The chief events of his reign include those in connection with the war against England, in which he was finally defeated at Solway Moss. He died a few days later at Caerlaverock Castle, on Dec. 14, 1542.

James V. was succeeded by his infant daughter Mary, who was born a few days before his death. Her reign is famous for the Reformation in Scotland and because of extended discussions regarding the question of uniting Scotland and England. She was affianced to the dauphin of France and sent to Paris to be educated, the government at home being conducted under the regency of her mother. Her marriage with the dauphin was celebrated in 1558, but his death two years later caused her to return to Scotland, where she found two well-organized parties, the Reformed party under the leadership of her half-brother, the Earl of Moray, and John Knox, and the Roman Catholics headed by Huntly. Her unfortunate mar-

riage to Darnley, in 1565, lost her the support of the Reformed party. Shortly after the murder of her husband she married Bothwell, which caused a large number of her subjects to become alienated. After vainly attempting to defend her rights against a strong confederacy at Loch Leven Castle, she was forced to abdicate in favor of her infant son, who, in 1567, became king under the regency of Moray. Soon after she attempted to recover the throne, but her forces were defeated and she escaped to England, where she was kept a prisoner for eighteen years by Elizabeth, and in 1587 was beheaded at Fotheringay Castle. Her son assumed the title of James VI., and on the death of Elizabeth, in 1603, succeeded to the throne of England, being the nearest heir. He is known as James I. of England. On receiving the crown at Westminster he assumed the title of King of Great Britain, France, and Ireland.

At the death of James VI., in 1625, the throne passed to Charles I., whose reign was disturbed greatly by foreign wars and internal troubles, and ended in his execution in 1649. His son, Charles II., became king under the promise that he would espouse the cause of the Covenanters, and landed in Scotland in 1650, but his reign was disturbed by the events attending the protectorate under Cromwell, and he was finally defeated at Drumclog in 1679. On his death, in 1685, he was succeeded by his brother as James VII. of Scotland and II. of England. His short reign was disturbed by religious dissensions. In 1689 William and Mary were placed on the throne by the Revolution, and they were succeeded by Queen Anne in 1702. The last meeting of the parliament of Scotland was held in 1706, when articles for the final union between Scotland and England were drawn up. This was the result of the general feeling that peace could not be maintained for any considerable time with the two countries separated. Among the conditions provided were that the name of the united country should be Great Britain, that the Presbyterian Church of Scotland should be maintained, that the crown of the United Kingdom should be vested in the Electress Sophia of Hanover and her heirs, being Protestants, that the laws and customs relating to property and private rights should be maintained in Scotland, that there should be free intercourse, equal trade, and citizen rights between the two countries, and that 16 peers and 45 members of the House of Commons should represent Scotland in the national Parliament in London. After that time the history of Scotland is merged into that of England and Great Britain.

SCOTT, David, historical painter, born in Edinburgh, Scotland, Oct. 10, 1806; died March 5, 1849. He was the son of Robert Scott, an engraver, who instructed him in landscape engraving, but soon he developed talent as a painter. His first display was made in 1828,

when he exhibited in Edinburgh his paintings entitled "Hopes of Early Genius," "Adam and Eve," and "Sarpedon Carried by Sleep and Death." In 1829 he became a member of the Scottish Academy, but soon after went to Rome to come in touch with the works of noted artists in the galleries of Italy. His paintings include illustrations of the "Ancient Mariner" and of "Pilgrim's Progress." Among his best known works are "Queen Elizabeth at the Theater," "Monograms of Man," "Nimrod," "Vasco da Gama Encountering the Spirit of the Cape," and "Cain." He wrote a number of articles for *Blackwood's Magazine* in the period from 1839 to 1841.

SCOTT, Duncan Campbell, poet, born in Ottawa, Ontario, Aug. 2, 1862. He studied in the common schools and at Stanstead Wesleyan College and in 1879 entered the civil service of Canada. Efficient work caused him to be promoted rapidly, and in 1893 he was made chief clerk accountant in the department of Indian affairs. Besides contributing to many magazines, he was an editor of the series entitled "The Makers of Canada." His books include "Labor and the Angel," "New World Lyrics and Ballads," "The Magic House," and "In the Village of Viger."

SCOTT, Sir Walter, eminent novelist, born in Edinburgh, Scotland, Aug. 15, 1771; died at Abbotsford, Sept. 21, 1832. He descended from a family of excellent standing and, though feeble as a child, he matured as a man of robust health and strength. After attending the high school of Edinburgh, he entered the university in that city, where he graduated. He was not distinguished as a student, but was famous among his



SIR WALTER SCOTT.

fellows for ingenuity in telling stories. After leaving the university, he began to practice the profession of law, being admitted to the bar in 1792. Law had little charm for him and his attention was soon attracted to English, German, and Italian authors. His first work as an author was in making translations from the German. These included Bürger's "Lenore" and "Der Wilde Jäger" (The Wild Huntsman), which met with success on being published in 1796. When a youth he had spent a part of his time at the farm of his grandfather near Kelso, where he became acquainted with legends, ruins, and historic localities. These he turned to good account in his ballads of "Glenfinlas" and the "Minstrelsy of the Scot-

tish Border," the latter appearing in three volumes in 1802.

He attained marked popularity in 1805 by publishing "The Lay of the Last Minstrel," a production written in an original ballad style. After publishing his "Marmion," in 1808, and "The Lady of the Lake," in 1810, he was offered the position of poet laureate, but declined that honor in favor of Robert Southey. Other poetical works written about the same time include "Lord of the Isles," "Vision of Don Roderick," "Harold the Dauntless," "Bridal of Triermain," "Doom of Devorgoil," and "Hali-don Hill." However, his popularity as a poet declined somewhat, partly because he was not fortunate in selecting the theme for his poem "Rokeby," and partly because of the eclipsing glory of Byron's genius, and hence entered the field of the novelist. In 1814 he published the first of the "Waverley Novels," which established an epoch in modern literature. Scott concealed the name of the author, but their popularity was such that the writer was spoken of as "The Great Unknown." Among the most popular of these novels are "Rob Roy," "Old Mortality," "Ivanhoe," "Guy Mannering," "Heart of Midlothian," and "Black Dwarf." His literary work proved highly profitable and he purchased a farm of 100 acres on the Tweed River, about three miles above Melrose, in 1818. As his resources increased, it was enlarged from time to time until he possessed an estate that became known as Abbotsford. Large sums of money were spent to improve this materially, and he showed remarkable liberality in aiding persons ambitious to become scholars and writers.

Scott had a partner in the publication of his books, the firm being known as Ballantyne & Co., but in 1825 it became involved through the failure of Constable & Co., Edinburgh publishers. His liabilities resulting from the failure amounted to \$650,000, but he declined the help of friends and an offer of compromise made by his creditors, preferring to make an effort to liquidate all obligations by his writings. Soon after he removed to Edinburgh, where he worked with remarkable industry on his later writings, which include "Life of Napoleon," the novel "Woodstock," and a series of tales from Scottish history entitled "Tales of a Grandfather." It was possible to pay his creditors \$200,000 within a short time. Excessive exertion made it necessary to visit Italy on account of failing health, but he was soon taken back to Abbotsford and died shortly after. His writings and copyrights brought in sufficient to pay off all his debts. He was buried in an aisle in Dryburgh Abbey.

Scott was a genial Scotchman, beloved by his neighbors and contemporaries, and noted alike for his honesty, kindness, and hospitality. As a story teller he has scarcely an equal, and his writings are popular among all classes of

readers. His poems have made the scenery of Scotland famous. All his writings have a good moral tone and tend to promote a sense of honor and a manly dignity of character. Among the honors bestowed upon him was a baronetcy by George IV. in 1820, and he was fittingly remembered by many important societies and associations. His best biography was written by John Gibson Lockhart, his son-in-law.

SCOTT, Winfield, distinguished general, born in Petersburg, Va., June 13, 1786; died at West Point, N. Y., May 29, 1866. He was

educated at William and Mary College, studied law and was admitted to the bar. In 1808 he entered the army as captain, and at the beginning of the War of 1812 was sent on an expedition into Canada. He fought



WINFIELD SCOTT.

with great bravery at Lundy's Lane and Queens-town, but was taken prisoner in the latter engagement. After being exchanged, he was promoted to the rank of major general and distinguished himself at the battles of Chippewa and Bridgewater, in 1814. He saw no active service after this until the nullification excitement in South Carolina, when he commanded at Charleston, and subsequently served against the Seminoles and Creeks. In 1841 he was made commander in chief of the United States army, and as such took charge of the Federal forces in the second year of the Mexican War, in 1847. After conducting a siege at Vera Cruz, he captured it, and in rapid succession took Cerro Gordo, Jalapa, and Puebla. Shortly after he won the victories of Contreras, Churubusco, and Chapultepec. On Sept. 14, 1847, he entered the City of Mexico, which he held until the treaty of peace was concluded in 1848. The Whigs nominated him for President in 1852, but he was defeated by Franklin Pierce, his Democratic opponent. Soon after he was commissioned to aid in rectifying the boundary line between the United States and Canada. He was still in command of the army at the beginning of the Civil War, but resigned the position in October, 1861. Scott was a man of imposing stature and enforced strict military discipline.

SCRANTON (skrăn'tŭn), the third city of Pennsylvania, county seat of Lackawanna County, in the northeastern part of the State. It is on the Lackawanna River, 160 miles north of Philadelphia, and has communication by the Erie, the Central of New Jersey, the Delaware

and Hudson, the Delaware, Lackawanna and Western, and other railroads. The city occupies a fine site on high and undulating land and has an area of twenty square miles. The streets are broad and well paved with stone and macadam. Electric street railways furnish transportation facilities to all parts of the city, and are connected with lines that penetrate the Wyoming valley and other sections of the country.

Scranton has several fine public parks and the residential sections are beautified by lawns and avenues of trees. Within the public square is a fine county courthouse. Other buildings of note include the city hall, the post office, the Everhart Museum, the Albright Memorial Library, the Board of Trade, the Masonic Temple, the Jermyn Hotel, and the Connell Building. About forty public school buildings of modern construction are maintained. It has the Taylor Hospital, the Home for the Friendless, several colleges and academies, the International School of Correspondence, and many fine church edifices.

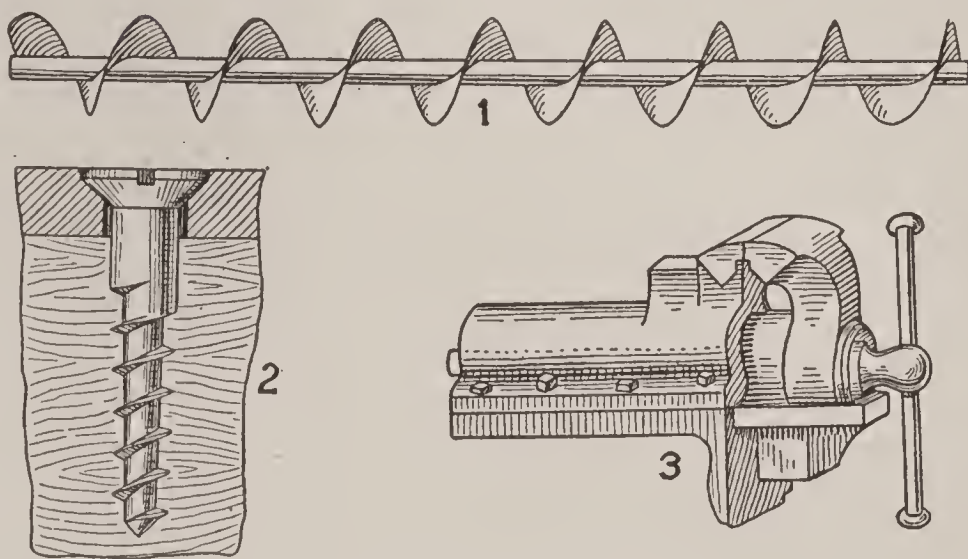
The surrounding country produces vast quantities of anthracite coal, of which it is an important distributing point. It has a large wholesaling and jobbing trade in merchandise and manufactures, and is an important market for fruits, cereals, and live stock. The manufactures represent a total capital of \$32,500,000. They include extensive knitting and lace curtain mills, iron foundries, locomotive works, and machine shops. Among the general manufactures are hardware, clothing, earthenware, glass, carpets, musical instruments, and spirituous liquors. Waterworks, sewerage, and gas and electric lighting are among the public utilities.

The first settlement in the vicinity of Scranton was made in 1788 by Philip Abbot of Connecticut, who opened a farm on the Roaring Brook, a tributary of the Lackawanna. It was named Slocum Hollow in 1799 from a family of that name. Two brothers, Joseph and George Scranton, founded the city in 1840 and named it. It was incorporated as a borough in 1854 and chartered as a city in 1866. The rapid growth is due to the development of its manufacturing and mining interests. Population, 1900, 102,026; in 1920, 137,700.

SCREAMER (skrēm'ēr), a class of wading birds native to South America. In habits they somewhat resemble the duck, but do not have webbed feet. They have large feet, a short, conical bill, a bare space around the eyes, and two spurs on each wing. The color is blackish-brown and the size is nearly that of a turkey. Screamers frequent swamps and marshes, where they feed on insects, water plants, and seeds. The *horned screamer* has a long, slender horn on the top of the head. It is nearly four feet

long and is seen mostly near the sea. These birds are found in large numbers in Brazil, Guiana, Venezuela, and other countries of South America. They are so named from their loud and harsh cry.

SCREW, one of the six mechanical powers, which is a modification of the inclined plane. It consists of a wooden or metal cylinder, called the *male screw*, having a groove or thread in an advancing spiral on its outer surface. It may be used separately, as in fastening metal to wood, but in fastening objects to metal a *female screw* is used in connection with a male screw corresponding in diametrical size and cut of the spiral ridge. If one be turned while the other remains fixed, as in the vise, there is an advance equal to the distance between two connective threads. The mechanical effect is increased by making the threads finer, or decreasing the distance between them, or by increasing the length of the lever by which



APPLICATION OF THE SCREW.

1, Screw conveyor; 2, common wood screw; 3, metallic vise.

the power is applied. If the power moves through a circumference of thirty inches and the distance between two consecutive threads is one-tenth of an inch, a force of one pound applied at the head of the screw will move a weight of 300 pounds at the other end, since the power moves through a distance 300 times as great as that which the weight moves. Equilibrium results when the circumference at which the force is applied bears the same proportion to the pitch of the screw as the distance bears to the applied force. Thus friction enters very largely as a modifying element. Many forms of the screw are employed in machinery and mechanical arts. In general it is used to exert great pressure or overcome great pressure through a short distance. Among the common forms are the screw nail, for fastening separate pieces of material; the gimlet, for boring; and the screw presses and jack-screws, for securing pressure. Other forms include the endless screw, ball screw, screw conveyor, Archimedian screw, screw propeller, etc.

SCREW PINE, or *Pandanus*, a genus of tropical plants in the Eastern Hemisphere, so named from their spiny-edged leaves. They

include both shrubs and trees and bear some resemblance to the palms. The leaves are two or three feet long, are shaped similar to a sword, and occur in three spirally arranged rows. When without branches, they resemble the pineapple plants. The common screw pine grows to a height of 25 feet and thrives in a poor but moist soil. Natives gather the unexpanded flowers as articles of food, and the odor of the bloom is utilized in making perfumes. An allied species grows somewhat taller and has leaves from six to ten feet long. The leaves yield fibers that are of value in making gunny bags. These trees are most abundant in the southern part of Asia and the East Indies. Some species are grown as ornamental plants in greenhouses.

SCREW PROPELLER, a contrivance used in the construction of sailing vessels of various kinds. It utilizes the principle of the screw in acting upon the water, for which purpose it is driven rapidly by steam power. It consists of a cylindrical or spherical hub, to which blades are attached so as to form the screw. Some are cast in one piece, while others are built up by bolting the blades to the hub, both being of bronze, iron, or steel. The shaft is made very strong and passes parallel to the keel into the engine room, where the steam is applied to cause it to revolve rapidly. Back of the ship, projecting from the stern, is the screw, usually submerged entirely below the surface of the water. One or more engines act upon the shaft either by cranks formed on the shaft or by means of geared wheels. The screw turns in the water as a bolt turns in a nut, but the pitch is not constant at all points, since it varies somewhat near the hub. No absolute rule can be given in reference to the diameter of the screw, which varies somewhat according to the speed desired and the size of the vessel to be propelled. Patents on screw propellers were awarded independently to John Ericsson and F. P. Smith in 1838, from which time the successful introduction may be said to date. The screw came into general use in 1870 and it is now the propeller employed generally, except where the water is too shallow.

SCRIBE, an order of teachers among the ancient Jews, whose office was to write and teach the Mosaic and traditional law. The name was first applied to military secretaries, who kept the records of the nation, recruited and organized troops, and levied the war taxes. At the time of the Babylonian captivity the language in which the law was written had become obsolete and a new order of scribes had arisen among the Levites, of whom Ezra was chief. To them was intrusted the task of transcribing and translating the law, and of applying it to conduct. They grew rapidly to influence, and at the time of Christ comprised the learned body of the nation, when they were looked upon as public teachers and

lawyers. Their rank was in accordance with their talents. The higher class occupied a place in the sanhedrim, practiced law, or taught in schools, while the less gifted engaged more largely in transcribing and writing laws. The scribes united with the chief priests in plotting the death of Christ.

SCRIBE (skrêb), **Augustin Eugène**, dramatist, born in Paris, France, Dec. 24, 1791; died Feb. 20, 1861. He studied law, but afterward turned his attention to the stage. In 1816 he began to write songs and small comedies, but soon developed great ability as a playwright. His productions include about 100 plays in three to five acts and 150 plays of one act, mostly sentimental or satirical comedies. He produced plays that were presented in the leading countries of Europe and America. His best known works include "Bertrand et Raton," "Adrienne Lecouvreur," "Le Diplomate," and "The Glass of Water."

SCROFULA (skrôf'û-là), a constitutional disease, either hereditary or acquired, leading up to the formation of tubercles in various tissues and organs of the body, chiefly in the lymphatic glands. It is generally inherited and is attended by glandular tumors that degenerate into ulcers, particularly at the side of the neck and under the angles of the jaw. The disease has a disposition to degenerate into consumption of the lungs or of the mesentery, a fold of the peritoneum that infests an intestine or other viscus and connects it with the abdominal wall. Scrofula is sometimes called *king's evil*, from the view long held in England that scrofulous tumors and abscesses could be cured by the king's touch.

SCRUPLE (skrup'l), a weight equal to one-third of a dram, or the 24th part of an ounce, as used in apothecaries weight. A scruple is equal to 20 grains.

SCUDDER (sküd'dêr), **Horace Elisha**, teacher and author, born in Boston, Mass., Oct. 16, 1838; died Jan. 11, 1902. He graduated from Williams College in 1858 and soon after entered the public schools of New York City as a teacher, where he did efficient work for three years. In 1862 he published "Seven Little People and Their Friends," a work that proved sufficiently successful to induce him to take up literature as a profession. He was editor of *The Riverside Magazine for Young People* from 1867 to 1870 and in 1890 removed to Cambridge, where he became the editor of the *Atlantic Monthly*. His numerous writings include "Dream Children," "Stories from My Attic," "Dwellers in Five-Sisters Court," "History of the United States," "Men and Letters," a monograph on "Noah Webster," and "Biography of Washington." He edited the *American Commonwealth Series* and with Mrs. Bayard Taylor published "Life and Letters of Bayard Taylor."

SCULPTURE (skûlp'tûr), the art of imi-

tating natural objects, chiefly the human body, by carving or chiseling figures from stone or other solid material, or of modeling them in some plastic substance for subsequent reproduction by carving or casting, as in bronze. The word is from a Latin term meaning to cut out or carve, but it is used to express the molding of figures in clay, wax, or other material, to be afterward cast in some metal or plaster.

PROCESSES. Sculptures are of two classes, known as sculpture proper and relief. In *sculpture* proper the three dimensions of length, breadth, and height are reproduced, while in *relief* the dimension of thickness or depth is relatively reduced. Different names are applied to productions in relief according to the depth in which the object is represented. *Bas-relief* is a common form and is a type of carving or sculpture in which the figure projects but slightly above the background. *Mezzo-rilievo* is a type of sculpture in half-relief, and *alto-rilievo* is a form in which the carving or figures stand out very strongly from the background.

MATERIALS AND METHODS. The materials generally used in sculpturing include marble, stone, ivory, gold, bronze, granite, and wood, but any substance that may be cut or molded into form is employed for various products. The art has many disadvantages as compared with painting in recording facts and representing ideas, since neither color nor picturesque backgrounds may be utilized in sculpture, though there are exceptions to this general rule. While paintings appeal to the sense of sight chiefly through color, sculptures rely wholly upon pure form, both of line and composition, thus differing from painting in the mode of expression. In modern sculpture the artist usually models his work in moist clay, which in the case of a large statue is supported by a skeleton framework. If the finished product is to be in marble, a plaster cast is made from this model, which a skilled workman uses in preparing a copy, while the sculptor puts on the finishing touches.

HISTORY. Sculpture is one of the most ancient of arts. Its origin is lost in antiquity. The first productions were in clay, but as knowledge advanced other materials, such as wax, marble, and bronze, came into use. It is remarkable that the most ancient sculptors did not seek to represent natural figures, but instead connected their products with mythology and religion, thus producing representations of strange and fantastic figures. The Egyptians made the earliest forms of higher art, and their sculptures differ from those of China and India in representing men engaged in various industries instead of confining them to gods and deformities of the human figure. Most of their products are large, and are peculiar for symmetry, stability, and calm and solemn expression. The most distinct and dignified sculptures of Egypt

date from the period included between 1500 and 1000 B. C., but there are large and remarkable productions dating much earlier, particularly the *Sphinx*, which is thought to date from about 4000 B. C. Assyrian sculpture is like that of Egypt in representing historical and general scenes. While more vigorous in spirit, it is much inferior in idealistic beauty and trueness to nature. It dates from the 9th and 10th centuries B. C. Persian sculpture reached its height of development in the period from 575 to 331 B. C., but is less beautiful and artistic than the Assyrian. The early sculptures of India are chiefly in connection with the religion of Buddhism and later Brahmanism, and all may be said to be inferior as art products. While the works of art produced in Egypt and Asia are of interest historically, they are particularly valuable as influencing the development of art among the Grecians, who carried sculpture to the highest perfection.

The first forms of Grecian art bear a close resemblance to those of the East, but by the 6th century B. C. a distinct school developed, and their artists began to replace the conventional and lifeless types of Eastern sculptures with human figures true to nature. Among the earliest works of Grecian art that have come down to us are the sculptures from the temple of Athena at Aegina, which date from about 475 B. C. A number of them are preserved in the museum at Munich, Germany. Phidias carried Grecian art to its highest perfection about 442 B. C. His most notable productions are the statues of Athene in the Parthenon and that of Zeus in the temple at Olympia. Sculpture in his time still retained connection with mythology, but it showed remarkable nearness in imitating nature, thus furnishing beautiful specimens of art in which human beauty was characterized by spiritual and godlike perfection. Sculpture declined for nearly a century after the time of Phidias, but new interest was awakened by Praxiteles about 363 B. C. This sculptor began to represent the human body more fully than the workmen prior to his time, and he was the first of the great artists to represent human form quite nude. Other noted artists of Greece include Scopas, who made the "Niobe Group," now at Florence; Chares, the author of the famous "Colossus of Rhodes;" and Agasias, the sculptor of the "Fighting Gladiator." Other productions dating from about the 4th century B. C. include the celebrated group of the "Laocoön," "Apollo Belvedere," "Venus of Milo," "Dying Gladiator," and "Dying Alexander."

Roman sculpture may be attributed wholly to Grecian artists, who found employment in all parts of Italy after the Roman conquest of Corinth. The Romans carried the finest treasures of art from Greece to Rome, whence many of the valuable specimens were transported to Byzantium in the 4th century A. D.

by Constantine. Art declined in Italy with the barbaric invasions from the north. It began to revive in the 10th century, but no material advancement was made until the early part of the 13th century, when Nicola Pisano carved a number of fine specimens of art at Pisa and Siena. His son, Giovanni, is the next artist of note, but the most marked progress in the revival of art began with Lorenzo Ghiberti (1381-1455), who made the wonderful doors of the baptistry of Florence. Donatello is noted for his statues of Saint George and Saint Mark. Verrocchio is the most famous sculptor of the 15th century, but the perfection of Italian art was reached in the sculptures of Michael Angelo in the 16th century. Lorenzo Bernini (1598-1680) is one of the most noted Italian sculptors of the 17th century. Canova is the greatest representative of the 18th century, and Monteverde and Gallori are the most prominent of the 19th.

Sculpture found its way from Italy toward the north and west with remarkable rapidity at the beginning of the revival of learning. At present there are representative schools in the different European and American countries. Among the noted sculptors of Germany are Albert Dürer, Peter Vischer, Rauch, Kiss, Bandel, Siemering, Drake, and Schilling. The sculptors of France include Jean Goujon, Pierre Puget, Rodin, Dubois, Houdon, and Mercié; those of Denmark, Thorwaldsen; and those of England, John Flaxman, John Gibson, Alfred Stevens, Watts, Gilbert, and John Henry Foley. The most eminent sculptors of the United States include Crawford, Greenough, Clevenger, Bartholomew, Rinehart, Keyser, Niehaus, Taft, French, Saint Gaudens, Story, Ward, Thompson, Hosmer, Rogers, and Warner. For further information consult the articles treating of the sculptors mentioned above.

SCURVY (skûr'vÿ), or **Scorbutus**, the name of a constitutional disease, due chiefly to the use of impure water and salt meat for a long period of time. Persons who subsist on a mixture of fresh vegetables and animal food are not subject to the malady. Those suffering from the disease experience great weakness, the face becomes sunken, and the gums relax and appear dark and spongy. Purple spots or patches appear upon the skin, due to an effusion of blood beneath the true skin or between superficial muscles, and these spots are not only painful but sometimes develop into ulcers. In the last stages the patient bleeds at the nose and vomits blood, and finally death occurs from exhaustion. Formerly scurvy was very devastating in the navies and merchant marine of all nations. It is now of rare occurrence, except among the poor and careless. Cleanliness, wholesome food, and proper dieting avert the disease entirely.

SCUTARI (skōō'tä-rē), a city of Asiatic Turkey, on the eastern shore of the Bosphorus,

opposite Constantinople. It occupies a fine site on slopes gradually rising from the water, has good railroad facilities, and is the seat of a large interior and foreign trade. Scutari has many beautiful mosques, baths, and bazaars, and is the seat of several educational institutions, including a dervish college. Its extensive cemeteries are famed for their beauty, being adorned with magnificent cypress trees and works of art. The high degree of interest in the cemeteries is due to the fact that the Turks look upon Asiatic soil as sacred, in which they desire to have their last resting place. Scutari is well fortified. It has a large trade in cereals and fruits. Among the manufactures are cotton textiles, silk and woolen goods, saddlery, implements, and machinery. The English occupied Scutari in the Crimean War. Immediately south of it is the burial ground established for the soldiers of the British army. Florence Nightingale made it the basis of her operations during that war, and in the burial ground is a beautiful monument in honor of the troops. Population, 1918, 78,485.

SCYLLA AND CHARYBDIS (sĭl'lā and kâ-rib'dis), two personages described by Homer, who regarded them highly dangerous to navigators. Scylla is at present the name of a rock in the Strait of Messina, on the western coast of the southern part of Italy, and near it, nearly opposite the entrance of the harbor of Messina, Sicily, is the celebrated whirlpool of Charybdis. The ancients associated the legend of Scylla and Charybdis with these two dangerous obstructions, representing Scylla as a monster with twelve feet and six mouths. According to their view, Charybdis three times each day sucked down the water of the sea, and as often threw it up. When Ulysses passed the terrible dangers of Scylla and Charybdis, the former swooped down and seized six of his crew from the deck. From this circumstance arose the proverb, "To shun Charybdis and fall into Scylla."

SCYTHER (sĭth), an implement used for mowing and reaping. It consists of a long, curved blade attached to a handle. The blade is sharpened on its inner or concave side, and is swung with both hands, the workman holding it by two smaller handles attached to the principal one. The scythe was preceded in general use by the *sickle*, an instrument with a short curved blade and a wooden handle, to be held in one hand when reaping. Later a framework of wooden bars was fastened above the blade of the scythe, thus forming the *cradle*. The scythe is used mostly in cutting grass and weeds on small farms and the cradle has taken its place in cutting grain. These implements are generally used in countries where farming is on a small scale or in a primitive state, the reaper having taken their place in all leading agricultural countries. However, all well-equipped farms have a scythe for various pur-

poses, such as cutting weeds and grasses where a mower cannot be used.

SCYTHIANS (sĭth'ĭ-anz), the name of a race of people that anciently occupied the region from the Carpathian Mountains in Europe to the Aral Sea in Asia, where they were found by the Greeks when settling on the northern shore of the Black Sea, in the 7th century B. C. Ancient writers used the name with considerable vagueness, often associating it with the Scoloti and other nomadic tribes, but the name Scythian was applied generally to the wandering tribes that occupied the region between the Carpathians and the Volga. These people led a wandering life, subsisting by rearing large herds of cattle, sheep, and horses. Their food consisted of cheese, milk, and boiled flesh, and their habitations were in wagons roofed with felt and drawn by oxen. As the food supply of one region became exhausted, they moved to newer pasture, their horses and cattle following, and later their sheep. The government was despotic. It was vested in a number of chiefs. Their warriors developed remarkable skill in handling the bow and arrow on horseback.

A large army of Scythians invaded Media in the latter part of the 7th century B. C., which they made subject for ten years, but were finally expelled by Cyaxares. In the 2d century B. C. they invaded Persia, where they founded a kingdom known as Indo-Scythia, and in the 1st century B. C. they secured a foothold in northern India, which they occupied about four centuries. Grecian writers regarded the Scythian language of Aryan derivation and as nearly akin to the Iranian. Scythia was the name of the region lying between the Volga and the frontier of India in the time of the Roman Empire.

SEA, or **Ocean**, the great body of salt water which covers about three-fifths of the earth's surface. It is one continuous expanse of water, but for the purpose of description and study it is generally divided into five smaller bodies. They are known as the Pacific, Atlantic, Indian, Arctic, and Antarctic oceans. The Pacific separates America from Australia and Asia, the Atlantic separates America from Europe and Africa, the Indian lies between Africa and Australia, and the Arctic and Antarctic lie respectively within the north and south polar circles. The comparative sizes may be stated in the following order: one-half of the entire water area of the earth is included in the Pacific, one-fourth in the Atlantic, one-fifth in the Indian, one-seventeenth in the Antarctic, and one-thirty-fifth in the Arctic.

The coast lines of the ocean are variously formed, but they may be arranged in the four classes which constitute inland seas, border seas, gulfs and bays, and fiords. *Inland seas* are those formed by a nearly continuous land border, as the Gulf of Mexico and the Red Sea; *border seas* are isolated from the rest of

the ocean by island chains and peninsulas, as the Gulf of Saint Lawrence and the Sea of Japan; *gulfs* and *bays* are broad expansions of the water extending but a small distance into the land, as the Bay of Biscay and the Gulf of Guinea; and *fiords* are deep inlets with high, rocky headlands, extending often from 40 to 100 miles into the land, as are found off the coasts of Norway and Chile.

The bed of the ocean is diversified like the surface of the land, having plains, mountains, rocks, and valleys, though the irregularities are fewer. It has been demonstrated by recent soundings that many of the plains and plateaus of the ocean are of great size, compared with those of the continents, and there are submerged mountain ranges both along the shores and in the deep ocean. The mean depth of the ocean is placed at 12,600 feet, or nearly two and a fourth miles. It is thought that the greatest depth of the Atlantic is in the neighborhood of the island of Saint Thomas, in the West Indies, where soundings have been established a depth of 27,300 feet. The deepest region in the Pacific Ocean is east of Japan, where a depth of 27,935 feet has been reached, this being somewhat less than the highest elevation of the land. It is found that the greatest depths are near the highest elevations, though there are some possible exceptions. The entire bulk of water in the ocean is placed at 323,813,000 cubic miles. It is estimated that if the surface of the earth were perfectly level a sheet of water two miles deep would entirely surround the crust.

Sea water in small quantities is transparent and colorless, but when viewed in a large mass it has a deep blue appearance. The reddish or greenish hue often seen in limited portions of the ocean is due to the presence of numberless organisms and the phosphorescence visible at night in some places arises from the presence of animalculae, but the latter phenomenon appears only where the air comes in contact with the water, as in the crests of waves or the disturbance of the surface due to the passage of a vessel. Sea water is heavier than fresh water in the proportion of 1.027 to 1, owing to its containing a number of saline ingredients. About three pounds of various saline matters are found to every hundred pounds of ocean water. The saltiness of the ocean is due to the evaporation taking up pure water, which is borne in the form of clouds to remote regions and dropped to the surface of the earth in the form of rain, which, as it flows through the channels of streams, carries large quantities of mineral matters into the sea. It is estimated that about 6,575 cubic miles of water are taken up in this way annually. Thus, it is not difficult to understand that large quantities of mineral ingredients are dissolved from the crust of the earth and carried with the current.

Oceanic water is affected constantly by vast

movements, which correspond to the motions of the atmospheric air. They are known as waves, tides, and currents. *Waves* are swaying movements of the water, caused by the action of the wind. Apparently the wave motion is in the direction in which the wave is advancing, but there is no perceptible progressive movement of the water, except in shallows. The height of waves depends upon nearness to the shore and the depth of the sea, ranging usually not over six feet in the open sea with a moderate wind, and in high storms from thirty to sixty feet. The wave motion decreases rapidly in proportion to the depth below the surface, and there is a very feeble effect at a depth of forty feet, even in moderately strong winds. *Tides* are the periodical risings and fallings of the water, caused by the attraction of the sun and moon. These follow each other with marked regularity about every six hours, and, unlike waves, whose motion is confined practically to the surface waters, tides influence the waters of the ocean from top to bottom.

Ocean currents affect the water of the sea with considerable regularity, causing it to move to and from the equatorial and polar regions. In this way they constantly produce an interchange of water between the lower and higher latitudes. They somewhat resemble rivers, but are vastly wider and deeper, and, unlike waves, consist in a real onward movement of the water. These currents are caused chiefly by the difference of density of water produced by the inequality of temperature between the equatorial and polar regions. The warmer waters from the equatorial region are upper currents and move both north and south from the Equator, but never cross it, and as they lose their heat they become denser, and, sinking to the bottom, spread throughout the ocean basin. It has been found that there is no perceptible difference in the temperature of the water near the bottom of the sea in any latitude, the extreme difference ranging from four to six degrees. The lowest temperature at the greatest depth near the Equator is about 35° Fahr. and in the highest latitude it reaches about 28° Fahr., while the temperature at the surface varies from 85° Fahr. in the former to 28° Fahr. in the latter region. Ordinary ocean water freezes at 27° Fahr., and in places where it is densely salt the freezing point is still lower. Since ice formed of ocean water is comparatively fresh, it follows that the salt, being separated as the water freezes, increases the per cent. of salt in the lower strata. For this reason the water below the ice may have a temperature lower than that at which the surface freezes, without being transformed into ice.

The constant circulation of water in the ocean causes a general distribution of oxygen and other atmospheric gases throughout the sea, even to the greatest depth. It follows from this that both plant and animal life may sub-

sist in all parts of the sea, but their form and size depend largely upon the depth and temperature. Animal life is most abundant at the surface and near the bottom, but there are living forms throughout the intervening space. The sea has many different species of both plants and animals, some being confined to the bottom, others floating in the water, and still others are in shallows, coming in contact with both the bottom and the surface. Pelagic deposits of matter at the bottom of the sea are remains of the fishes and other forms of life that sink after death. Other deposits, known as terrigenous, are formed of earthy matter carried into the sea by the movements of oceanic waters and through the action of streams.

SEA ANEMONE (à-nēm'ō-ně), the name of several animals belonging to the polyps, or zoöphytes, called *actinians* by some writers. They are low in the scale of life and are fastened at one end to the surface of rocks or stones in the water, but are able to move slowly. At the upper or free extremities are their mouths, which are surrounded by arms or tentacles. The body is vasselike, usually about three inches in diameter, and the height is from three to five inches. They seize their food by the tentacles, which they move outward in all directions, and at the extremity is a stinging cell. When a small fish or shrimp comes in contact with certain tentacles, it is immediately seized and paralyzed by the cells, and is then dragged into the distensible mouth, where it undergoes the first process of digestion. Later the food passes to the lower part of the digestive canal, where it undergoes the final digestive processes. These animals multiply by eggs as well as by budding, and frequently from ten to twenty young forms spring from the base of the adult. Some species are popular in natural collections, where they may be made the subject of a very interesting study.

SEA CUCUMBER, or **Holothuria**, the name of the highest class of radiated animals, so called from their elongated and more or less warty and cylindrical form. Some writers designate them as sea slugs, owing to their vermicular mode of creeping. When parts of the body are destroyed, they are reproduced quite rapidly. The body is rather soft, having no covering like that of the starfishes and sea urchins, and motion is effected principally by longitudinal rows of suckers on the sides of the body. Water introduced and ejected causes motion and enables them to extend the body greatly in length and width. The sexes are distinct and some multiply by means of fission, but most species promulgate by means of eggs. In size they vary greatly, ranging from the small species off the New England coast to the large size in the Bay of Fundy and on the shores of Newfoundland. Species from ten inches to a foot in length and from three to

four inches in circumference are found in the mud flats of the Florida reefs.

SEA EAGLE. See *Eagle*.

SEA HORSE. See *Hippocampus*.

SEAL, the general name of certain genera of carnivorous mammals, having feet adapted for swimming and being able to live both in and out of water. The body is long and slender, tapering toward the tail, and the small head is destitute of outside ears. They have five toes on each limb, joined to each other by webs. The two fore limbs are short and adapted to crawling out of the water, and the hind limbs project backward on each side of the tail. Seals are able to remain under water nearly half an hour, where they pursue their prey by swimming with great rapidity, but their movements on land are awkward. Most of the time is spent in water, but seals congregate a part

of value in making articles of wear, such as caps, ladies' cloaks, and trimmings. They are employed to some extent for card cases, pocket-books, and other articles. The oil, known in the market as *seal oil*, is made from the fat or blubber, and is more valuable than whale oil. The fur is of a grayish-brown color, mottled with black, and is usually dyed before being used for articles of wear.

Many species of seals have been described, varying somewhat in size, nativity, and habits. The *common seal* is most abundant in the northern regions. It attains a length of from three to five feet. The female usually produces one young at a birth, but sometimes two. They are animals of considerable intelligence, having large and brilliant eyes and a well-developed sense of smell, and may be trained to perform peculiar tricks when domesticated. It is pos-



SEALS.

1, Common Seal; 2, Sea Lion; 3, Greenland Seal.

of the time on the shores, where they repose and bask in the sunshine on sand banks, ice fields, or rocks. There they bring forth their young. They subsist mostly on fishes, which they pursue with marked skill, often chasing them up the mouths of rivers, but they also feed on crabs and other forms of marine life. In the warm season they move toward the colder regions of the North and South poles, and in winter go to the milder waters.

The seals make holes in the ice in winter, thus enabling them to come up to breathe, where they are often watched by the Esquimos and caught for their flesh and skin. The oil is of value in lighting, warming, and cooking. Their skins are used in making clothes, coverings of capes and coats, and for footwear. The sinews are employed by the natives in making fishing lines and thread. Sealskins form an important commodity of commerce, being

sible to teach them to come when called by name, and to obey instruction of various kinds. The *sea lion* is a larger species, attaining a length of from ten to twelve feet, and a weight of about 1,000 pounds. It is destitute of fur, but its hide, fat, flesh, sinews, and intestines are useful to the natives and in commerce. Sea lions are found in the North and South Pacific, particularly on the coast of the Kurile Islands, off Kamchatka, and in the vicinity of San Francisco. The *harp seal* is a species common to the northern part of Europe. The *crested seal* has a peculiar crest above the nose and is native to the northern parts of North America. A spotted species, known as the *leopard seal*, is native to the South Orkney Islands. The *elephant seal*, or *sea elephant*, is the largest of this class of animals. It is native to the Antarctic seas and attains a length of from twenty to thirty feet. The *northern*

sea lion is a species having a small outer ear, an extended neck, and a mane of crisp hairs on its neck and shoulders. It is native to Alaska and the Pribilof Islands. An allied species, the *fur seal*, or *sea bear*, is native to the polar regions. It has a brown or gray-brown fur of much value.

It requires considerable patience and skill to successfully conduct seal hunting, owing to the gregarious habits of most species, and their tendency to have one or more sentinels constantly watching for danger. The most extensive hair-seal fisheries are off Newfoundland, in the Caspian Sea, and off Jan Mayen, but nearly half the world's supply is secured off Newfoundland. The principal fur-seal fisheries are off the coasts and islands of Alaska and Kamchatka. Seals are most commonly secured by shooting while congregated on the ice, but in some cases they are watched at their holes in the ice and secured by inflicting a wound on the head administered by a club or some similar implement. Reckless destruction of these animals has caused the supply to decrease rapidly. In 1870 about 100,000 seals were taken in the vicinity of Bering Sea, but there has been a general decrease until in 1908 only 22,470 skins were secured in the same region. It is thought that ultimately pelagic sealing, the killing of seals in the deep sea, should be prohibited entirely and that the sealing season on the coasts should be limited to several months, in order to preserve a supply of these animals.

SEALED ORDERS, the term applied to orders issued and delivered to the commanding officer of a ship or squadron, whose seal is not to be broken until the vessel has reached sea. In such cases all on board are ignorant of the destination of the vessel, this being unknown even to the commander. Sealed orders are issued when a ship or squadron is sent on any secret service, the object being to prevent information regarding the movements becoming known.

SEALING WAX, a composition for sealing letters or packets, designed both to protect the message and receive the impression of a seal fixed to an instrument. In the Middle Ages sealing wax was made of beeswax and turpentine, and to these was added a coloring matter, usually vermilion. At present beeswax is not used in making sealing wax, but shell-lac is the principal component. The fine grade of sealing wax for stationery contains about seven parts of shell-lac, four of turpentine, and from three to four of vermilion. Inferior grades contain common resin and the coloring used is red lead, but black coloring is not infrequent. Sealing wax was first employed in China in the 7th century, whence it was introduced into Europe.

SEA LION. See **Seal**.

SEA MOUSE, the name of a small worm found in the sea. It is covered with fine hairs

or bristles, hence resembles the mouse in appearance. The body is about two inches in length and when exposed to light the hairs show iridescent hues of great beauty. Several species have been described, some of which are found in the Atlantic at great depths. They are frequently brought to the surface or thrown upon the shore by storms.

SEA OTTER, an animal found off the islands and shores of the North Pacific. It is about three feet long, has a stout form and a massive head, and bears a dark brown fur of value in the market. Formerly these animals were very numerous along the coast from Puget Sound to Bering Strait, but fur traders have hunted them so persistently that they are now becoming rare. The skin of a sea otter is valued at from \$500 to \$1,500. These animals live in the sea a greater part of the time and subsist principally on fish, crabs, and sea urchins.

SEARCH, Right of, the right that a belligerent nation has to examine the papers and cargoes of private ships sailing on the high seas, in order to ascertain their character and designation. The right of search is limited to the officers of cruisers that have been lawfully commissioned by a nation at war, but ships cannot be detained or boarded by the public ships of another power in the time of general peace, since such an act is an intrusion upon the rights of the State whose ships are so visited. However, in the time of war the general consent of nations yields to the belligerent the privilege of searching the ships professing to be neutral. This is quite necessary in order to have it known whether the neutral flag masks an enemy or covers contraband of war. Both persons and goods found concealed unlawfully may be captured. The War of 1812 was caused partly by England insisting upon the right of search.

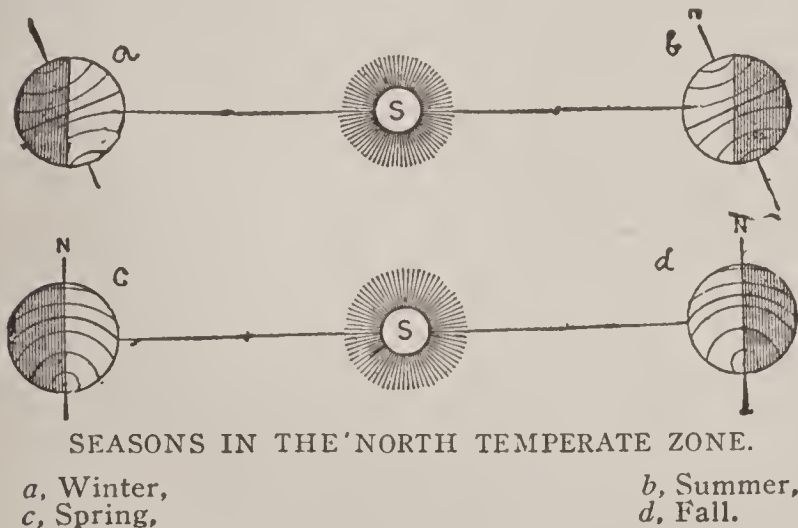
SEARS (sērz), **Barnas**, educator, born at Sandisfield, Mass., Nov. 19, 1802; died July 6, 1880. He graduated at Brown University in 1825 and subsequently studied at Newton Theological Seminary. In 1830 he was made pastor of a Baptist Church at Hartford, Conn., and subsequently studied in the German universities of Berlin and Leipsic. He was made professor of theology at Newton Theological Seminary, of which he subsequently became president. In 1848 he was appointed secretary of the Massachusetts Board of Education, succeeding Horace Mann, but resigned to become president of Brown University in 1855. After serving efficiently for twelve years, he became general agent of the Peabody Educational Fund. He was editor of the *Christian Review* for several years. He published "The Life of Luther" and edited Nöhden's "German Grammar."

SEA SERPENT, the name of a monster supposed by some writers to exist in the sea. It has been described in the literature of many countries, but such an animal has never been

captured and its existence is purely mythical. Such a monster was first mentioned in Norse literature, in which it is described as being 200 feet long and 20 feet in circumference. Paul Egede, while on a voyage from Norway to Greenland, in 1734, claimed to have seen a living sea serpent. Since then numerous reports have been published. A. C. Oudemans, an English writer, in 1892, published an account of the various appearances of the sea serpent in a work entitled "The Great Sea Serpent." While a few scientific men are inclined to believe that some marine reptile like the plesiosaurus is in existence, the large majority give no credence to the suggestion. It is probable that floating logs, schools of porpoises, the ribbon fish, or collections of seaweed are the source of this mythical animal.

SEASICKNESS, a nervous affection due to the motion of ships at sea. The early symptoms are headache and nausea, which are followed by vomiting and general weakness. While oscillations and movements to which persons are not accustomed are known to be the general causes, the exact origin and nature are not perfectly understood. Frequently it attacks the strong and cautious, while the weak and careless are unaffected. Usually it passes away in a few hours, but sometimes continues several days or during the entire voyage. Persons in middle life are subject to the more severe attacks, while children and aged persons are less liable to the malady. Soda water, calomel, and bromide of potash are sometimes prescribed, while others escape by lying down when they feel uncomfortable. See **Gyroscope**.

SEASON, the division of the year as determined by the position of the earth with respect to the sun and as marked by a particular state of moisture, temperature, vegetation, and



difference in the length of day and night. The rays of the sun shine directly on the Equator on the 21st of March, and fall directly on localities farther north until the 21st of June, when the sun is directly over the Tropic of Cancer. It begins to move southward on the latter date, shining directly on the Equator on the 22d of September, but continues the movement southward until the 21st of December, when it shines directly on the Tropic of Capricorn and thence

again moves northward. The effect is that four seasons occur in the Temperate zones, namely, spring, summer, autumn and winter. Only two seasons occur in the tropics, the wet and the dry, this being due to an almost uniform temperature throughout the year and to the fact that rain follows the sun. This results in a wet season succeeded by a dry season at the tropics, while in the vicinity of the Equator there are two wet seasons and two dry seasons each year, this being due to the circumstance that the sun crosses the Equator twice each year. In effect there are but two seasons in the Arctic and Antarctic regions, a long, cold winter and a short, dry summer. The four distinct seasons are found only in the middle portions of the Temperate zones. They are modified noticeably by proximity to the sea and elevation above sea level.

In speaking of the seasons from an astronomical standpoint, it may be said that spring extends from the vernal equinox, when the sun enters Aries, to the summer solstice; summer, from the summer solstice to the autumnal equinox; autumn, from the autumnal equinox to the winter solstice; and winter, from the winter solstice to the vernal equinox. However, this is true only of the North Temperate Zone, since the seasons are reversed in the Southern Hemisphere. The greatest summer heat is not reached on June 21, when the days are longest, for the reason that as the rays of the sun shine more nearly vertical on the earth's surface a quantity of heat is stored, and, when this is united with the heat received at the time the days begin to decline in length, the temperature gradually rises until the sun's rays fall quite obliquely on the surface. In the same way the coldest days do not occur near Dec. 21, when the days are shortest, but some time thereafter, when practically all the latent heat stored in the surface during the summer has radiated. It will be observed that the warmest part of the day is shortly after noon and the coldest part of the night in the morning, this being due to the same cause.

SEA SQUIRT, the name applied to several species of *Ascidians*, owing to their habit of squirting jets of water when irritated. The young resemble a tadpole, and the adult is constituted of leathery or gristly tissues. These animals are found in many places attached to shells and stones near the shores of the sea. They are mollusks of a low class.

SEATTLE (sê-ăt't'l), the largest city in Washington, county seat of King County, on Elliot Bay, an inlet from Puget Sound. It is 28 miles north of Tacoma, 345 miles west of Spokane, and 125 miles inland from the Pacific Ocean. The city occupies a fine site between Puget Sound on the west and Lake Washington on the east, the area included within the limits being about thirty square miles. The ground rises gradually from the waters of Puget Sound,

but in some places has elevations of 300 feet, and the higher altitudes are separated by beautiful valleys or terraces. Along the waterfront is a narrow tract, peculiarly suited for docks, wharves, and railway yards. The streets are regularly platted and the principal thoroughfares extend north and south. They are finely paved with stone, asphalt, vitrified brick, macadam, and wooden blocks.

DESCRIPTION. Seattle is beautified by numerous parks of great beauty. These include Lincoln, Denny, Woodland, Kennaer, Volunteer, Washington, and Ravenna, the last mentioned being a public ground in which the natural scenery is finely preserved. Extensive grounds are located at Fort Lawton and the State university. Brick and stone constitute the principal materials used in building, but in much of the newer buildings the steel frame has been utilized. Among the public structures are the county courthouse, the city hall, the Federal building, the Carnegie public library, the high school, and the buildings of the State university. It is the seat of the University of Washington, in which the educational system of the State culminates. Other institutions include several fine public school buildings, the Seattle Seminary, the Academy of the Holy Name, the College of the Immaculatē Conception, and several private and denominational institutions. The public library, constructed by a gift of \$200,000 by Andrew Carnegie, contains 50,000 volumes. Hotel Washington, the Butler, the Seattle, and the Rainier are among the leading hotels.

INDUSTRIES. The city has transportation facilities by the Northern Pacific, the Great Northern, the Chicago, Milwaukee, and Saint Paul, and other railways. A network of electric lines furnish transportation to all parts of the city and branches extend to Tacoma and other cities of the State. The harbor is safe and extensive and is reached by the largest ocean steamers at all seasons of the year. Puget Sound is connected with Union and Washington lakes by a canal recently completed by the Federal government, hence additional landing and anchorage facilities are afforded by the valuable harbor on Lake Washington. The foreign trade has a value of \$60,500,000. It consists largely of exports to the markets of Asia. The products exported include lumber, coal, cotton, wheat, flour, gold and silver, cured and packed meats, fruits, and machinery. The city has an extensive wholesaling and jobbing trade and ships large quantities of lumber and shingles to eastern points.

Seattle has vast interests in manufacturing enterprises, whose products have an annual value of \$35,500,000. The principal establishments include flouring mills, lumber yards, slaughtering and meat-packing plants, machine shops, and shipyards. Among the general manufactures are confectionery, furniture, carriages, dairy

products, canned fish and fruits, clothing, and tobacco products. Vast power is derived from Snoqualmie Falls, on a river of the same name, about 25 miles southeast of the city. At Port Orchard, about fourteen miles from Seattle, is the Puget Sound Naval Station. The streets are well lighted with gas and electricity and it has extensive systems of waterworks and sewerage, both of which are owned and controlled by the municipality.

HISTORY. The first settlement on the site of Seattle was established in 1852 and it was named from an Indian chief. It was platted the following year, but remained a village until 1880, when it was chartered as a city. At an early date it became prominent as a commercial center for the Puget Sound region, and its prosperity was greatly augmented by the discovery of gold in Alaska. A great fire swept over the business district in 1889, but it was soon rebuilt on a much more substantial plan. The building of railroads and the establishment of steamboat lines made it a commercial rival of San Francisco, and since then its increase in wealth and population has been continuous. In 1909 it was the seat of the Alaska-Yukon Exposition. Population, 1900, 80,671; in 1920, 315,652.

SEA URCHIN, the name of a genus of marine animals, belonging to the class *Echinoidea*. These animals are widely distributed in the shallow waters and along the coasts of the sea. The body is anchored to the bottom, or to rocks, and is studded with movable spines. While living, the shell and spines are quite flexible, but they become hard when dried and the shell assumes a more or less globular form. If undisturbed in the water, they expand the upper extremity, but it is drawn together rapidly when touched or irritated. They propagate by small eggs. The young swim freely while in the larval stage, but pass through complicated phases of development. Large numbers are found on the coasts of the Pacific, especially where the sea covers the surface during high tides, and when the water is low or has flowed entirely away they are preyed upon by crows and other birds. Some large species, as those of the Mediterranean, are gathered as an article of food.

SEBASTIAN (sê-bās'chān), **Don**, King of Portugal, born in Lisbon in 1554; died August 4, 1578. He succeeded his grandfather, John III., in 1557 under a regency. At an early age he gave evidence of great fondness for the sciences and military conquests. In 1574 he conducted an expedition against Tangier, Morocco, and made a second invasion of that country four years later. In the Battle of Elcazar he and a large part of his army were slain. Portugal now became a prey to anarchy and was soon annexed by Philip II. of Spain. It became current among the people that their king was not slain and would return, and this gave rise to many impostors who pretended to be the true

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